PROJECT DISPUTE RESOLUTION SATISFACTION

OF

CONSTRUCTION CLIENTS

IN

HONG KONG

SAI-ON CHEUNG

LLB(HONS), MBA, MCIOB, ARICS

MHKIE, AHKIS, ACIArb, AAIQS

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the requirements of the University of Wolverhampton for the

degree of Doctor of Philosophy

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Author's Declaration

This work or any part thereof has not previously been presented in any form to the University or to any other body whether for the purposes of assessment, publication or for any other purpose. Save for any express acknowledgements, references and/or bibliographies cited in the work, I confirm that the intellectual content of the work is the result of my own efforts and of no other person.

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ABSTRACT

Inspired by the concern over the dispute epidemic within the construction industry in Hong Kong, this research study sets out to examine the issue of construction dispute resolution from a management perspective. The main objectives of this research include the identification, through in-depth investigation and exploration, of the critical attributes that distinguish between Good and Bad projects in terms of their project dispute resolution satisfaction, and the development of a quantitative model for the prediction of same. Project dispute resolution satisfaction is defined as Good if the largest dispute was resolved within the site level.

The novel application of the fault tree analysis provides the conceptual definition of a construction dispute. Variables selection for the model development was accomplished through a systematic and comprehensive literature review. The sustainability of the questionnaire so derived was successfully tested by a pilot study with industry experts, bringing into the research the valuable local and practical dimensions. The research problem as presented fits nicely with the classification and prediction ability of the multivariate discriminant analysis and artificial neural network multi-layer perceptron modeling. Both techniques were employed in this research for the identification of critical variables and the model development. The verification of the critical variables was carried out through a relative importance index study. The use of a principal component analysis groups the discriminating variables into three factors represented as a three level influence diagram.

The relative importance index study confirmed the discriminating variables identified in the multivariate discriminant analysis model function. These variables are:

The average change of tender price index;

The claim consciousness of the contractor;

The degree of design changes;

The relationship between the project personnel;

The use of alternative dispute resolution as provided in the contract;

The degree of involvement of an external claim advisor by the client;

The incentive of the client to settle the dispute during the resolution process;

The degree of involvement of senior management during the resolution process.

Prediction of project dispute resolution satisfaction by the model function achieved an accuracy of 76.92% on the hold-out sample. The sensitivity analysis of the mean for the 'Best' network obtained from the artificial neural network multi-layer perceptron modeling suggests that the degree of design changes could well be the pivotal root to all the problems associated with construction dispute resolution.

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List of Acronyms

The following acronyms were used in the thesis:

Alternative Dispute Resolution	ADR
Artificial Neural Network	ANN
Dispute Resolution Satisfaction	DRS
Mean Square Error	MSE
Multi-Layer Perceptron	MLP
Multivariate Discriminant Analysis	MDA
National Public Works Conference	NPWC
Principal Component Factor Analysis	PCFA
Processing Elements	PE's
Relative Importance Index	RII
The Average Change of Tender Price Index	E_TENIN
The Claim Consciousness of the Contractor	O_CLAM
The Experience of the Contractor	O_COEXP
The Previous Working Relationship between the Client and the Contractor	O_PRWKRE
The Degree of Design Changes	P_DESCH
The Degree of Involvement of the Client during the Construction Process	P_INV_CL
The Relationship between the Project Personnel	P_REL
The Contractor Selection Criteria	P_SELCRI
The Degree of use of Alternative Dispute Resolution as provided in the Contract	R_ADR
The Use of an External Claim Advisor by the Client	R_ADV_CL
The Incentive of the Client to Settle	R_INC_CL
The Degree of Involvement of Senior Management during the Resolution Process	R_MAN_CL
The Possibility of Future Use of the Contractor	R_FUT_CO
The Negotiation Skill of the Client's Team	R_NEG_CL

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CHAPTER ONE
INTRODUCTION

1.1 Introduction

Construction project developments require the co-ordinated efforts of project personnel, typically coming from different organisations and from different professional backgrounds. The conflict of interest among these participants provides the source of most disputes. Whilst the success of a construction project is usually measured by the achievement of the time, cost and quality elements of the project, the satisfaction of the project participants is also of great importance. The last two decades have seen the emergence of a large volume of contractual claims and disputes. Resolving construction disputes has not proved easy. The cost of litigation is substantial and the process of litigation and arbitration is acrimonious. Management time is spent on 'unproductive' dispute meetings rather than the pursuit of project objectives. This investigation broadly seeks to:

1. Identify the discriminating variables that affect project dispute resolution outcomes.
2. Develop a predictive model to predict client satisfaction in dispute resolution.

In order to achieve these objectives, there is a need to define a construction dispute in the first instance and to gain an overview of the various dispute resolution processes.

1.2 Construction Disputes

1.2.1 Introduction

Construction activities are, in most situations, governed by contract. Hence construction disputes are mainly contractual. Most construction contracts seldom provide a precise definition of a dispute. However, closer examination allows a systematic conceptualisation of construction disputes. Fault tree analysis is used in the risk management process to assess the conditions where a fault will occur. In the same context, the following section presents a fault tree representation of construction disputes.

1.2.2 Fault Tree Representation

Fault trees provide a systematic way of identifying faults. If disputes are considered as something that both parties wish to avoid, similar to the identification of fault components through the use of a fault tree, analysis of the occurrence of disputes can be done on the basis of a fault tree model. The analysis is useful as a diagnostic tool for identifying failure paths and critical events.

In a fault tree diagram, the failure event, or `top event' is decomposed into sub-events that can be still further decomposed until `basic events' are reached. `Basic events' are events that require no further development. The top or head event is the loss, accident or unwanted event. Sub-events are contributors to this. The links in the fault tree identify the sequences that lead to the top event. The tree permits the thinking through of the possible causes of a loss and quantifies the probability of the loss.

The relationships between the events are represented by logic gates - 'OR' gates for union and 'AND' gates for intersection. For example in Fig. 1.1 below, either event E_5 or E_6 will result in event E_1, while both events E_3 and E_4 together will lead to event E_2.

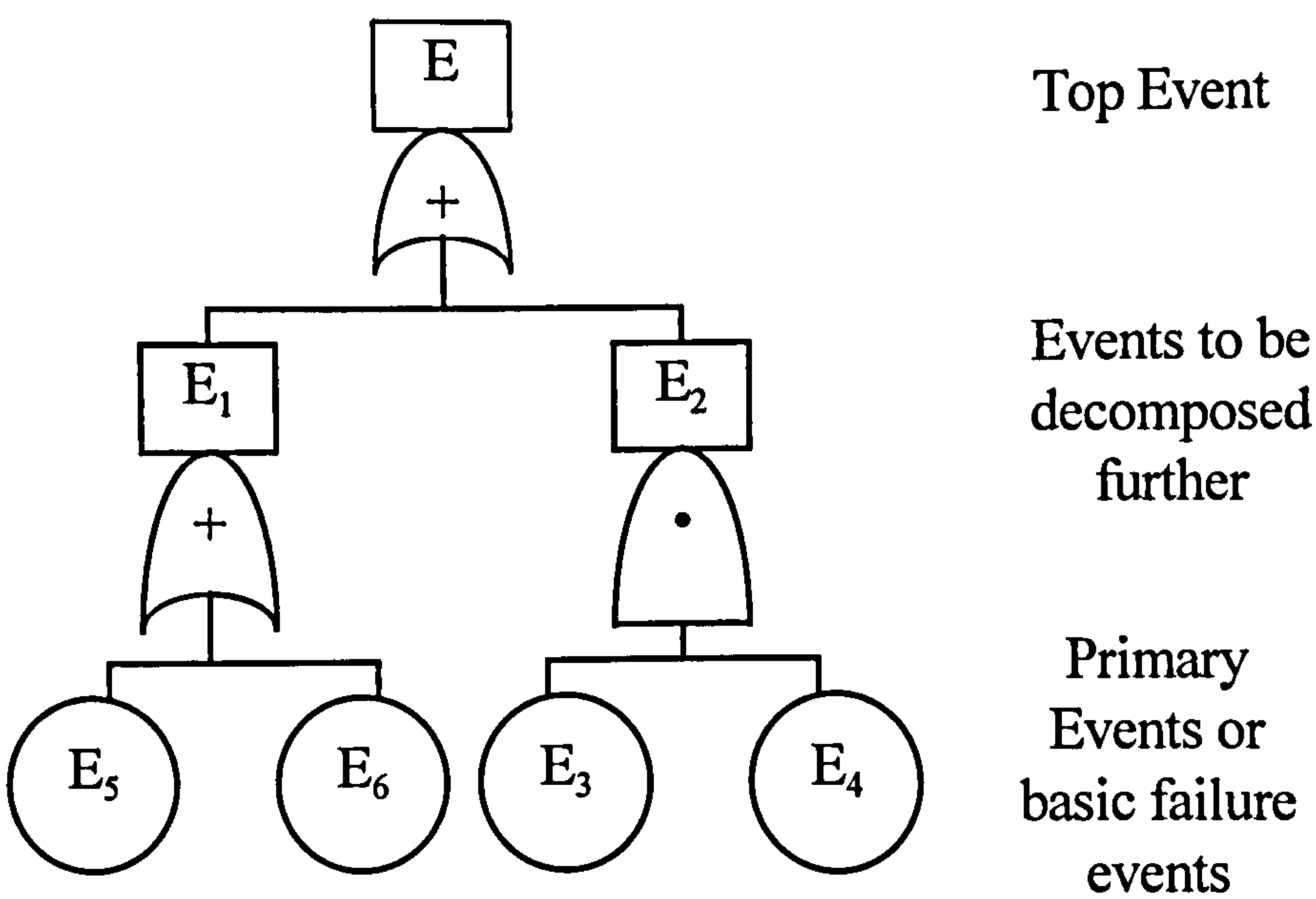
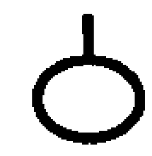


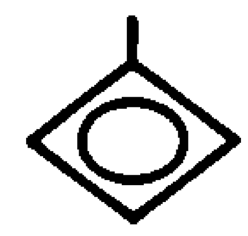
Fig. 1.1: Example of a Fault Tree

Basic events can further be sub-grouped into events that requires no further development; events that are evaluated separately and events where no further development is possible because the necessary information is unavailable. Fig. 1.2 below explains the common symbols used in a fault tree analysis.

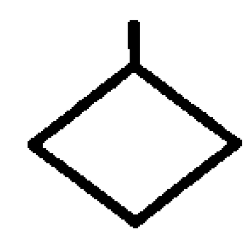
Basic Event:
The circle describes a basic fault event that requires no further development.



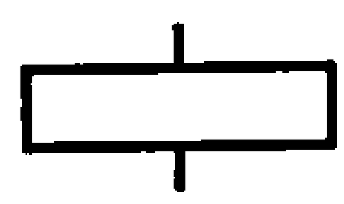
Basic Event:
The circle within a diamond indicates a sub-tree evaluated separately.



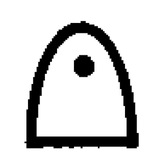
Basic Event:
The diamond describes a fault event that is considered basic in a given fault tree. The possible causes of the event are not developed because the event is insignificant in consequence or the necessary information is unavailable.



Combination Event:
The rectangle identifies an event that results from the combination of basic events through the input logic gates.



AND Gate:
AND gates describe the logical operation whereby the coexistence of all input events are required to produce the output event.



OR Gate:
OR gates define the situation whereby the output event will exist if one or more of the input events exists

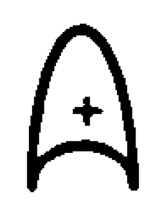


Fig. 1.2: Common Symbols used in Fault Tree Analysis

1.2.3 Triggering Event: the First Ingredient

Construction problems manifest themselves when errors are revealed. Changes and ineffective communication create bottlenecks and thereby inefficiency. Claims are the inevitable and eventual outlet. The instigation of claims is typically upon the occurrence of certain events, called triggering events. The fundamental purpose of a construction contract is to record a commercial agreement. This includes the delineation of the parties' responsibility, risk ownership, the performance required and the approval procedures. Provisions for making adjustments are now standard features in every construction contracts. Triggering events typically occur when these adjustment provisions are invoked.

1.2.4 Conflict: The Second Ingredient

In construction, words like dispute and conflict carry a negative connotation, and, to a certain extent, are even litigious. These two words have sometimes been used fairly loosely and synonymously. However, a general depiction of the terminology will reveal that conflict is the underlying cause of a dispute. In other words, a dispute is the manifestation of the underlying conflict(s).

De Bono (1985) describes conflict as a clash of interests, values, actions, or direction. Conflict refers to the occurrence of that clash. Tillet (1991), in supporting the general depiction, refers to conflicts as being related to deep human needs and values. Sometimes they are expressed in problems or disputes, which may be the superficial manifestation of a conflict.

The distinction between conflict and dispute can also be discussed in the light of their resolution. Burton (1990) describes disputes as situations where issues are negotiable, in which there can be compromise; and which, therefore, do not involve consideration of altered institutions and structures as in the case of conflict resolution. According to Tillet (1991), a dispute arises when two (or more) people (or groups) perceive that their interests, needs, or goals are incompatible, and seek to maximise fulfilment of their own interests, or needs through bargaining or negotiation. This is often reached through compromise: to obtain that which is most important, one party may yield to the other on that which is less important. Disputes are therefore usually settled.

As disputes are manifestations of conflict between the parties, another ingredient of a dispute therefore is the existence of conflict. Conflict can be identified as a clash between the needs or values of the disputants (Fig. 1.3).

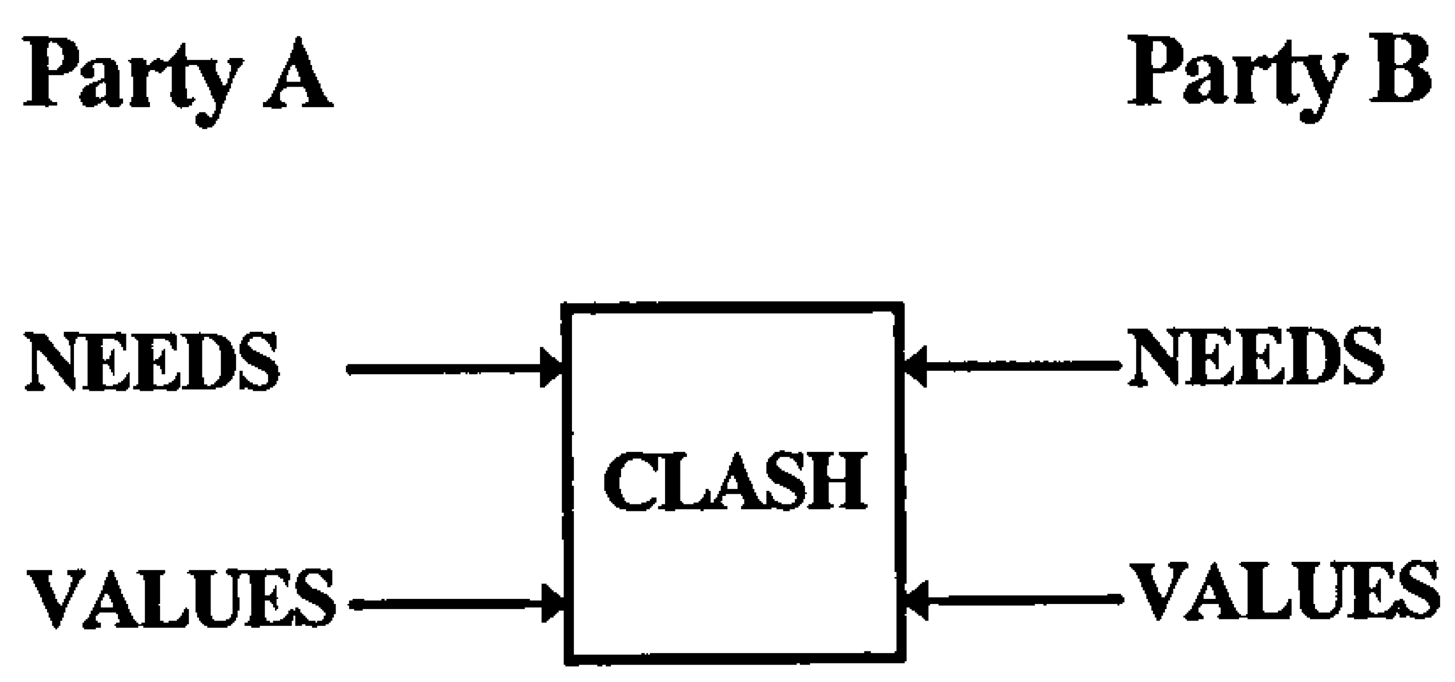


Fig. 1.3: Parties A & B in Conflict

1.2.5 Crystallisation of Construction Disputes: the Third Ingredient

Construction problems often give rise to claims. However, not all claims will be elevated to a dispute. Mururu (1991) argues convincingly that in order to invoke the dispute resolution clause in a construction contract, there must be a dispute already in existence as evidenced by the serving of a notice of dispute.

From this it is then possible to analyse the stages leading to a dispute. A party formulates a position and asserts it; the other party rejects it or otherwise disagrees with it; the aggrieved party does not accept the rejection. It is only after this that a dispute can be said to be in existence. It then follows that the rejection of a claim does not automatically create a dispute. This is because the other party could accept the rejection. Lack of agreement is also inadequate. A situation where the parties neither agree nor disagree about the true position does not amount to a dispute.

The existence of a dispute can be crystallised through the contract machinery. As in the HKIA[1] form, if the contractor is dissatisfied with the decision of the architect, the contractor must convey his dissatisfaction and reassert the case. The reassertion serves as a declaration of a dispute in existence. Likewise, under the HKG form[2] (Clause 86), if the contractor is not satisfied with the decision of the architect, he should make a request that the matter be referred to mediation or arbitration. A dispute is evidenced by such a request.

The requirement under the HKG ACP contract[3] (Clause 92) appears to be more formalistic. Clause 92(2) states that

" ..... A Dispute shall be deemed to arise when one party serves on the Engineer and on the other party a notice in writing (hereinafter called a `Notice of Dispute') stating the nature of dispute."

The definitions of a dispute emphasise the existence of incompatibilities between need and value. This formulation of position has to be somehow explicit and should be able to be recognised by making reference to at least one provision in the

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[1] Agreement & Schedule of Conditions of Building Contract for use in Hong Kong, Standard Form of Building Contract, Private Edition - With Quantities. The Hong Kong Institute of Architects, The Royal Institution of Chartered Surveyors(Hong Kong Branch) & The Society of Builders, Hong Kong.

[2] Hong Kong Government General Conditions of Contract for use in Building Works 1993 edition.

[3] Hong Kong Government General Conditions of Contract for use in Airport Core Projects 1992 edition.

contract. As long as the matter is related to the contract, whether of material substance or the intention of the parties in relation to the interpretation of the contract, the legal decisions tend to adopt a `legal practicality' approach and confirm the jurisdiction of the settlement of dispute or arbitration clause (Chatterjee 1994).

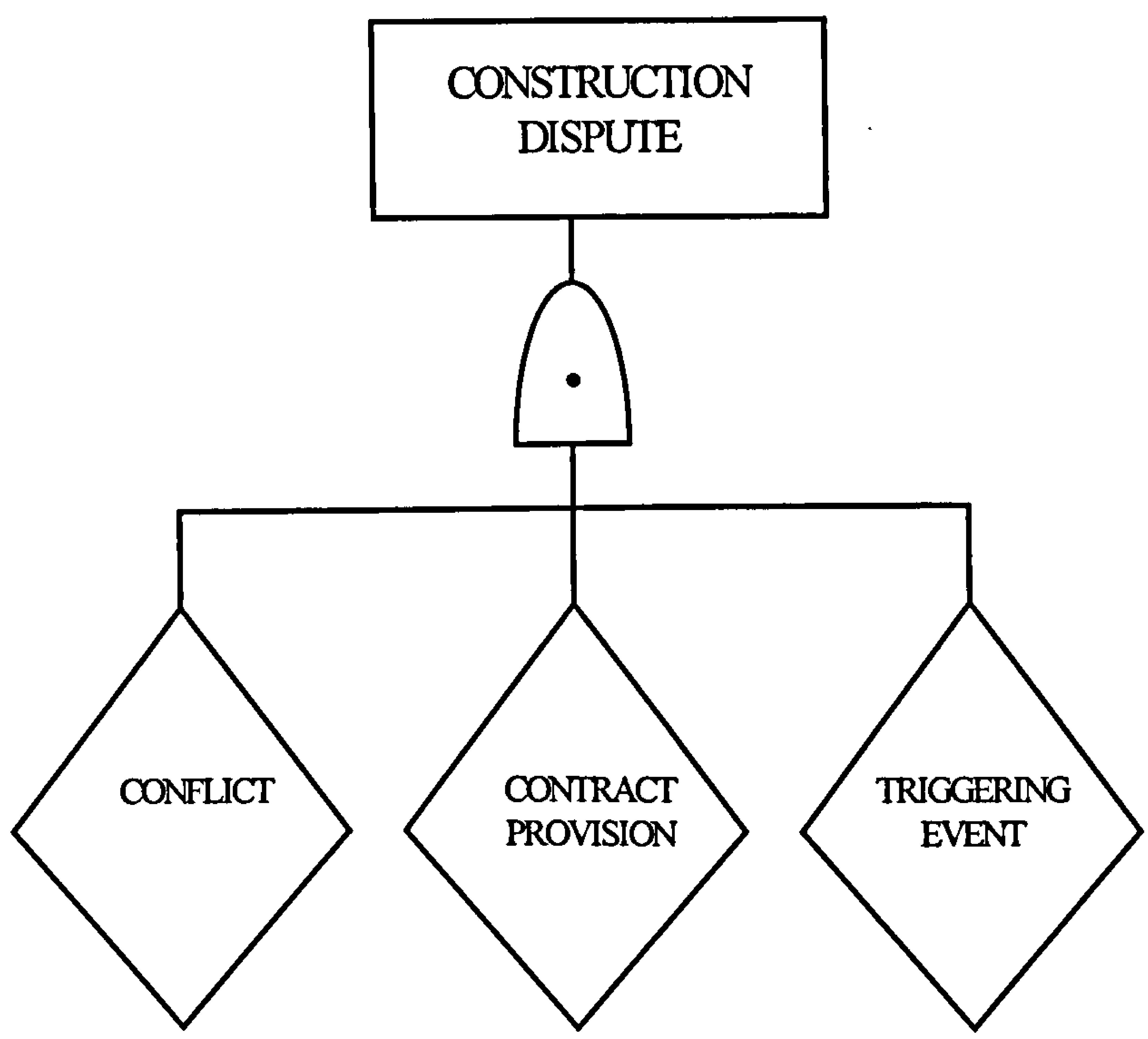


Fig.1.4: A Fault Tree for the Occurrence of Construction Disputes

In sum, a potential dispute arises if there exists an incompatibility between needs or values between the parties, i.e. the parties are in conflict. However, for a construction dispute to crystallise, the contract machinery must be invoked. This is usually triggered upon the occurrence of a situation in which the party or parties invoke the contract machinery. For construction contractual disputes, the reference to a contract clause is a must (Hughes & Barber 1992).

Employing the symbols and the occurrence of construction disputes can be analysed and presented in a fault tree. Fig. 1.4 shows the simplest form.

In Fig. 1.4, the occurrence of a dispute is analysed by the use of a fault tree model. As explained and discussed in Sections 1.2.3 to 1.2.5, the occurrence of construction disputes results from the occurrence of three conditions: a triggering event, a relevant contract provision and the existence of conflict.

1.3 Dispute Resolution in Construction

Nowadays in complex construction projects, resolving disputes has become an inevitable part of a project manager's work. This includes a wide range of activities ranging from the selection of a dispute resolution process to the participation in the actual negotiation. An understanding of the various forms of dispute resolution processes and their critical factors will no doubt be valuable to project managers in handling disputes.

Formalised dispute resolution techniques like arbitration and litigation have been well developed for the resolution of construction disputes. However, the lengthy process and the high cost involved have called for alternatives. These alternatives are characterised by the flexibility allowed. Collectively, these processes are called Alternative Dispute Resolution (ADR).

The use of ADR in the construction industry in Hong Kong is still embryonic. In the public sector, it was in the early 1990's that the Hong Kong Government incorporated mediation as an integral part of the dispute resolution clause, in all the standard forms of contracts, for use in Government projects. In the private sector, arbitration remains the prevailing dispute resolution method. It has been suggested that resistance to change is the major obstacle to the implementation of ADR in construction. Lack of knowledge and experience underpin such resistance.

1.3.1 Construction Dispute Resolution Techniques

The stair-step chart of Figure 1.5 depicts the dispute resolution methods currently and commonly used in the construction industry. Most of these are held in private except for arbitration and litigation, which are governed by standard practice.

The rising steps in the chart intimate the escalating levels of hostility and cost associated with the various forms of dispute resolution. The hierarchy starts with prevention techniques. The use of prevention techniques aims at creating teamwork and harmony, thereby preventing disputes from arising. Equitable risk sharing and incentives for co-operation are usually initiated by clients, whereas the success of partnering relies on contributions of all parties involved in the construction process. It has been suggested that where a long term relationship is important to the contracting parties, prevention techniques should be adopted.

Prevention techniques do not guarantee total dispute elimination. Problems cropping up during construction still need to be resolved. Resolving construction problems typically starts with negotiation between the disputants. In negotiation, the parties have absolute freedom with respect to the form, process and the type of agreement. Negotiating through a construction problem demands co-operative efforts from the disputants.

If negotiation fails, the disputants may choose to seek assistance from a neutral third party. There are two possible formats, the standing neutral and the non-binding resolution. The standing neutral concept involves the participation of a neutral person adjunct to the construction phase of a project, thereby solving problems at the source. This method is relatively inexpensive because problems are addressed relatively informally and while facts are fresh. A dispute review board and dispute resolution advisor have been used for this purpose.

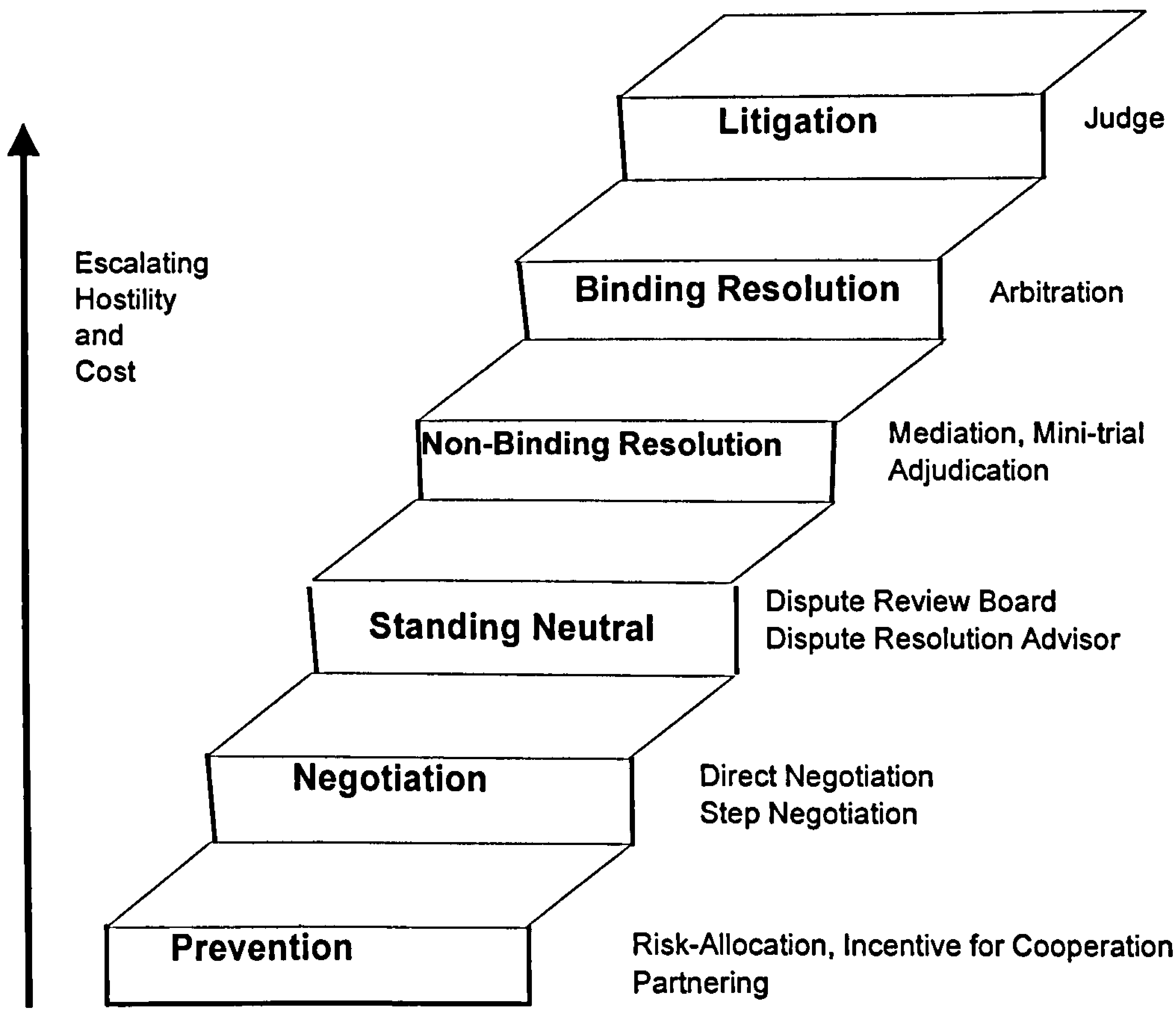


Fig. 1.5: Construction Dispute Resolution Steps (Adapted from Groton, 1992)

Alternative Dispute Resolution techniques such as mediation, mini-trial and adjudication are typical examples of non-binding resolution. These are employed after a problem has fully developed into a dispute. These processes require more development of historical facts and greater preparation. Beyond this stage, positions become more polarised and costs to both parties begin to mount.

If the dispute is not resolved amicably through ADR procedures, the next step is to refer the dispute to a third party for a binding decision. This typically is a giant step, involving formal identification of opposing positions and issues. These require considerable preparation by the parties, typically with the assistance of lawyers, consultants and expert witnesses. This is the case for an arbitration, a proceeding before a private judge, or the even more public and expensive step of litigation. Arbitration is by far the most commonly used method for solving construction disputes. Most construction contracts contain an arbitration clause requiring the parties to refer any dispute to arbitration.

At the top end of the stair-step chart is litigation. Litigation is a rigidly regulated process, the process being subjected to the rules and procedures set out by the court. By adopting the litigation route, the parties surrender their control over the process and the outcome is imposed by a third party.

The sequential treatment of the steps also suggests that if a dispute can be resolved at the lower steps in the resolution step-chart, the dispute resolution process will be less painful and less costly. Overall, the project participants will feel more satisfied with the resolution outcome. This proposition underpins the definition of Dispute Resolution Satisfaction (DRS) used in this thesis. The details of the treatment of DRS are given in Chapter Two.

1.3.2 Formalised Dispute Resolution Processes

Construction ventures are characterised by a high degree of uncertainty and complexity. Drafting of construction contract documentation is no easy task and typically involves the inclusion of provisions for anticipatory contingencies. However, complete forecasting of all eventualities is almost impossible. Construction disputes often arise over such unanticipated happenings. Figure 1.6 outlines the procedures involved in an typical arbitration proceeding.

Whilst formalised dispute resolution processes such as arbitration and litigation are useful in vindicating right and wrong, such an outcome may not be the real desire of the disputants. In this context, a rationalised dispute resolution process that meets the real expectations of the dispute resolution users would gain wide acceptance. Alternative dispute resolution techniques have been introduced to meet this need.

1.3.3 Alternative Dispute Resolution

Alternative dispute resolution has developed over the last two decades as a response to the high cost and lengthy process associated with arbitration and litigation. Both methods involve the application of strict procedural rules and the involvement of the legal profession. ADR techniques, however, do not require the involvement of the legal profession. Tyrril (1992) provides a comprehensive list of the alternative dispute resolution methods available for use in the construction industry in Australia.

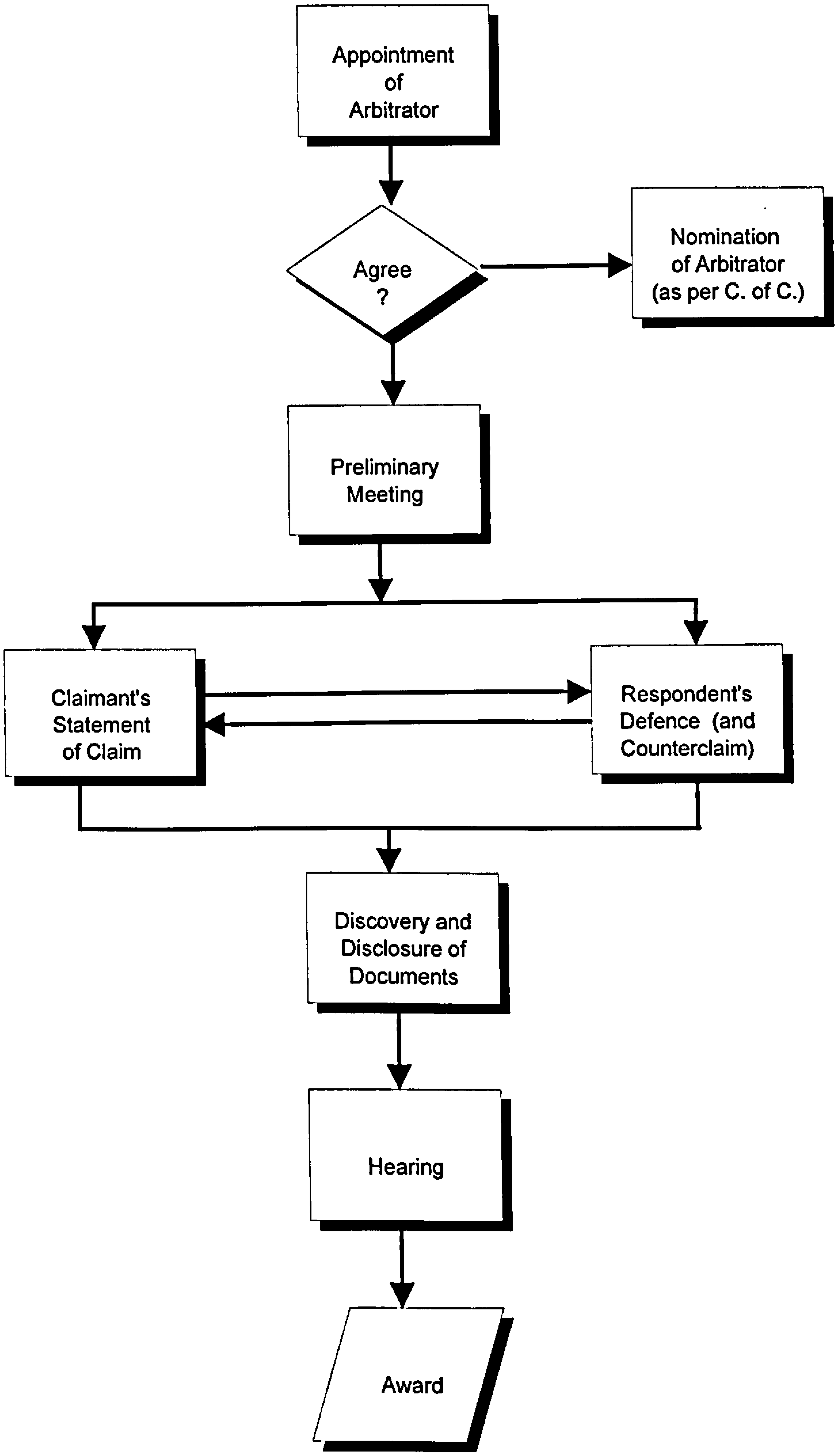


Fig. 1.6: Arbitration procedures (Adapted from Hellard, 1987)

These include expedited arbitration, S27, conducted under Commercial Arbitration Act; structured negotiation; conferences; conciliation; mediation; non-binding expert appraisal; expert determination; senior executive appraisal; mini-trial and dispute board of review. Though dissimilar in the details, these methods do exhibit a common theme: advocating a problem-solving approach and breaking out of the embrace of the legal profession and the adversarial and confrontational approach. It is believed that arbitration and litigation tend to generate strong emotions and drive out rational discussion, thus preventing amicable resolution. Figure 1.7 presents the procedures typical to ADR techniques.

Although there exists a wide range of ADR techniques, the common forms used in the construction industry in Hong Kong include mediation, dispute resolution advisors and adjudication.

In Hong Kong, ADR provisions are found in standard conditions of contracts published by the Government. The situation in the United Kingdom is a little different. Under S.108 of the Housing Grants, Construction and Regeneration Act 1996, adjudication provision shall become a must in all construction contracts. Under S.108(3), a construction contract shall provide that the decision of the adjudicator is binding until the dispute is finally determined by legal proceedings, by arbitration (if the contract provides for arbitration or the parties otherwise agree to arbitration) or by agreement. In addition, The parties may agree to accept the decision of the adjudicator as finally determining the dispute.

Many writers have offered definitions of ADR (Naughton 1990, Hanbury 1992, Goldberg, Sander & Rogers 1992, Pears 1989, Stipanowich & Henderson 1992, Kwayle 1993). In this study ADR is taken as those resolution methods other than negotiation, arbitration and litigation. Mediation and conciliation will also be treated as being synonymous.

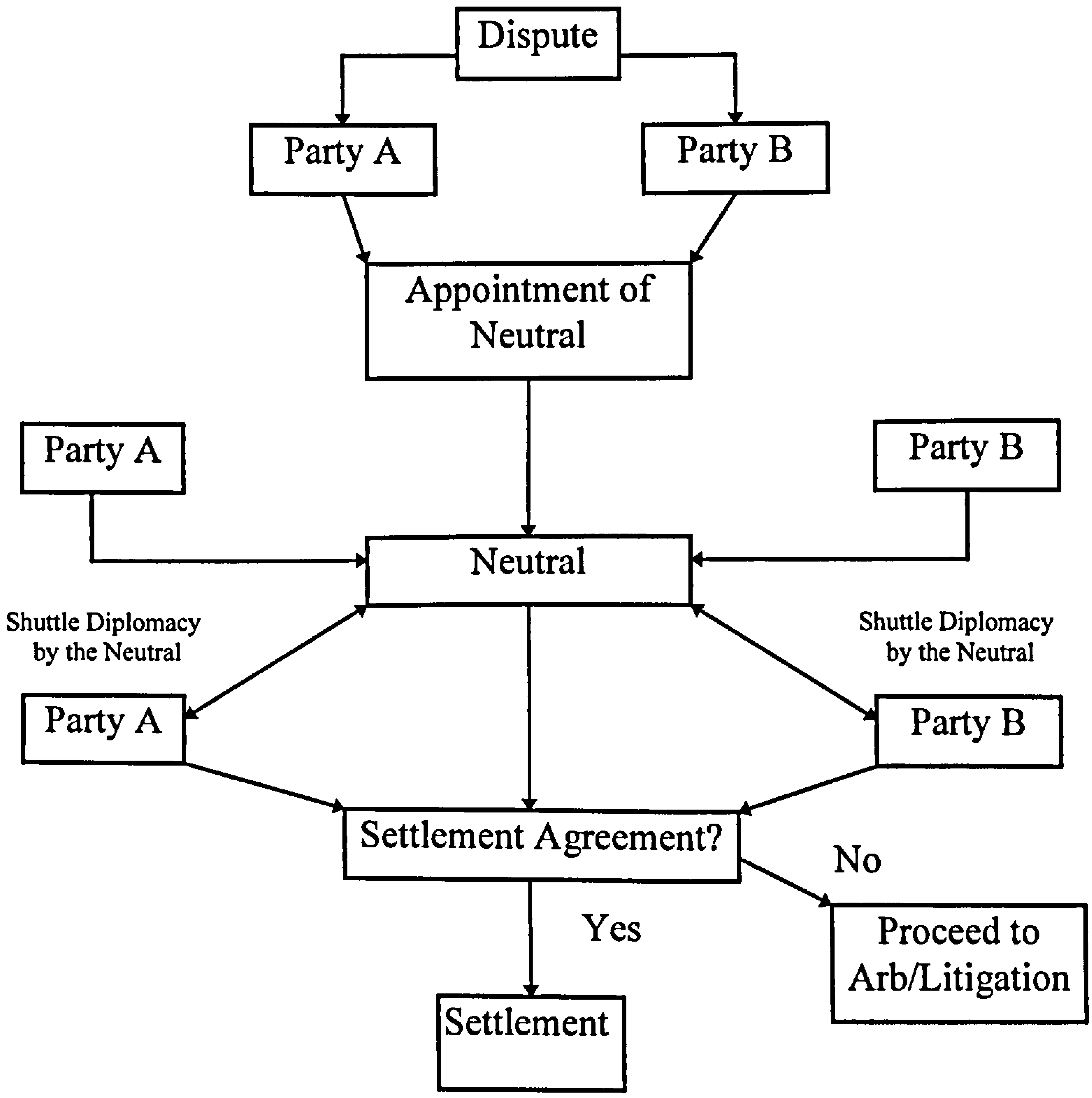


Fig. 1.7: Alternative Dispute Resolution Process

Conciliation and mediation are very similar, both in nature and in process. Distinction has been placed on the degree of participation by the neutral person. However, it has been suggested that the distinction between conciliation and mediation by active/passive involvement is not useful. Conciliation seems to be the preferred choice in international and European usage; in North America and Australia mediation is pre-eminent (Street 1992). In Hong Kong, mediation is the favoured choice.

A dispute board of review is similar in nature to the mediation structure. The structure of a board of review would normally contain a senior executive from each disputant party and an impartial third party agreed upon by the disputants. In many respects the third party has the ability in such a caucus to act as both an expert appraiser and a mediator.

As an extension to mediation, mini-trials can be used. These are normally adopted where significant dispute exists between the decision makers of both parties. This form is perhaps the last opportunity to avoid formal arbitration or litigation. This is not a formal trial as such, but is a structured information exchange attended by representatives authorised to settle the dispute. An advocate from each party makes a presentation of its case to a panel comprising authorised decision makers and a neutral adviser. The authorised decision makers meet on their own, immediately after presentations are made, to negotiate a settlement.

The advantages of ADR processes can be summarised in three contexts: cost, relation and flexibility (Naughton 1990). In terms of cost, the use of ADR will save costs in legal fee and also management resources. ADR is also considered as a way of avoiding bitter feelings that may result from the adversarial process such as arbitration and litigation. The third advantage is the flexibility allowed in ADR processes. The procedures to be used in an ADR process can be tailored to suit the parties' requirements. In particular, the processes should be designed to enhance efficient communication (Kwayke 1993, Mackie 1992). The use of ADR would increase the probability of achieving a "win/win" result for all the parties involved and the advantage of having access to an expert skilled in all aspects of ADR to develop innovative techniques and solutions for dispute resolution (Pengilley 1990).

The use of ADR will not be successful unless certain prerequisites are understood and adopted by the users. According to Pengilley (1990), the philosophical prerequisites to a successful use of ADR are:

* All ADR results are a compromise.
* ADR must involve a "win/win" solution to the problem (actual or perceived).
* Parties must be realistically aware that ADR is the Best Alternative to Negotiated Agreement (BATNA).
* There must be realistic company administrative procedures to encourage ADR as company policy.

In support of the above, The Senate Standing Committee on Legal and Constitutional Affairs in Australia (1991) points out that an ideal dispute resolution mechanism should contain, *inter alia*, the above requirements.

The No Dispute document (NWPC 1990) adds further that ADR would not be successful if the parties did not have mutual respect and understanding for each other. In a similar context, ADR will not bring the desired outcome if either side does not have the genuine desire to resolve the dispute by the simple method.

It must also be realised that ADR processes are not always the preferred mode of dispute resolution. Bevan (1992) expresses his reservation in the use of mediation under circumstances where there is a wide power disparity between the parties. Pengilley(1990) opines that some types of dispute are better handled in the court system:

* Cases where the purpose of the dispute resolution is to establish a societal norm or legal precedent.
* Some issues will commend themselves for judicial decision when at least one of the disputants does not want to take the responsibility for any ultimate decision.
* Only courts can provide official recognition of some events, for example, divorce and bankruptcy.
* ADR will be inappropriate where one party does not want a settlement. Personality factor can be a reason. It may also be in the commercial interests of a party to delay a hearing.
* In some cases, there simply is no adjudicator other than a court which has the authority to decide the issue and whose decision will be accepted.

Not all the above are directly applicable to the construction industry. However, if the matter in dispute is about a point of law and a legal precedent is sought, then ADR would not be the appropriate method. Obviously, if the disputing parties are not willing to settle, going through an ADR process would just be a waste of time. Sometimes, ADR has been used as a delaying tactic so as to buy time for preparation.

1.4 Arrangement of the Chapters

Chapter Two presents a literature review of studies in relation to construction disputes. It introduces the use of dispute resolution satisfaction as a measure of project outcome and sets out the detailed thesis objectives. Chapter Three discusses the use of predictive modelling as a management tool. This chapter also outlines the approach used in the Multivariate Discriminant Analysis (MDA) model developed for this investigation. Chapter Four discusses in detail the approaches taken in the variable selection and explains the categories of variables proposed for this investigation. The process of designing the questionnaire necessary in securing the variables data is also reported in detail in this chapter. Preliminary analyses are given in Chapter Five. This chapter includes variable selection, variable measurements and checking of the suitability of the data for MDA analysis. Chapter Six reports on the discriminant functions derived from selected variables. An artificial neural network is also adopted as a further tool and in this respect a Multi-layer Perceptron (MLP) neural network is also used in this thesis to carry out classification. The model so obtained is compared with the MDA model and is discussed in this chapter. The reliability of the MDA and MLP models is being tested by the Relative Importance Index (RII) method. The findings of the RII method are given in Chapter Eight. The RII study confirms the reliability of the MDA model. The discriminating variables identified in the MDA function are elaborated and discussed in full in Chapter Nine. To enhance the interpretation, a Principal Component Factor Analysis (PCFA) was performed to group the variables into factors. The resulting factors provide valuable insight into interpreting the discriminating variables. Chapter Ten presents the conclusions.

CHAPTER TWO
PROJECT OUTCOME: A DISPUTE RESOLUTION APPROACH

2.1 Project Success: Dispute Resolution Satisfaction as a Measure

The measurement of project success is a complex task (de Wit 1988). Project success is usually measured by the degree of achievement of project objectives. These objectives are usually expressed in terms of time, cost and quality requirement. This definition of project success implies that only the engineering portion of the total project life cycle is considered. Furthermore, it has been argued that success depends on the perceptions of the party. The criteria for measuring project success also varies with the level of management under examination. Success is also time-dependent. Hence to think that one can objectively measure the success of a project is an illusion (de Wit 1986).

Measuring project success has been topical. However, difficulties remain in the selection of criteria with which to measure success. Such criteria vary among persons and with the phase of projects (Parfitt & Sanvido 1993).

Parfitt and Sanvido (1993) acknowledge that project success varies with each participant and hence defined project success as the overall achievement of project goals and expectations.

What else then needs to be included in order to make the definition comprehensive? Ashley (1986), in a pilot study on project success, identifies the following success criteria frequently used to measure construction project success:

* Budget Performance;
* Schedule Performance;

* Functionality;
* Client Satisfaction;
* Contractor Satisfaction;
* Project Manager/Team Satisfaction.

The last three items relate to satisfaction and collectively can be understood to be the satisfaction of those affected by the project.

Over the years, researchers have attempted to define and study success criteria. The definition of project success by Ashley, Lurie and Jaselskis (1987) is:

"Results much better than expected or normally observed in terms of cost, schedule, quality, safety and participant satisfaction".

Tuman (1986) provides an alternative: "Having everything turn out as hoped. Anticipating all project requirements and have sufficient resources to meet needs in a timely manner".

The definition of project success by de Wit (1986) is "The project is considered an overall success if the project meets the technical performance specifications and/or mission to be performed, and if there is a high level of satisfaction concerning the project outcome among: people in the parent organisation, key people in the project team, and key users or clientele of the project effort".

Another example of the inclusion of satisfaction as a project success criterion can be found in the study carried out by Wuellner (1990). The study is the development of a checklist for evaluating how well a consulting engineering firm performed on projects. Satisfaction of the client was included as one of the six measures for gauging the engineering consultant's project performance. Clients' satisfaction was related as the satisfaction towards the service provided by the consulting engineer and whether opportunities for future service were recognised and acted upon. By the same token, similar to the consulting engineer, for contractors and clients with a satisfactory project, future co-operation or work will be possible.

Hence it can be seen that in addition to the triple constraints of time, cost and quality, Satisfaction of those involved in the project development process is another important criterion by which to measure project success.

The measurement of project success by time, cost and quality was described as a 'hard' measure in contrast to the measurement of clients' satisfaction as 'soft' (Bresnen & Haslam 1991).

The use of satisfaction poses a measurement difficulty. de Wit (1988) treated the satisfaction of those affected as "the absence of criticism". This implies a binary identification, presence or absence.

This broadly defined 'satisfaction' allows a wide range of success parameters to be included. This could be viewed from the perspectives of project participants, clients, contractors, consultants, specialist subcontractors and the like. Both quantitative and qualitative measures can be addressed.

Project satisfaction has also been considered in the light of conflict (Mohsini & Davidson 1992). In a study of the traditional building process, Mohsini and Davidson (1992) considered the relationship between conflicts and project performance (the traditional building process refers to a typical arrangement of the project being designed and built by two separate groups: the design group and the construction group). The main hypothesis underlying the study contends that an improperly organised and managed building process induces organisational conflicts among the participating task-organisations and that such conflicts affect the projects' performance (Davidson 1989, Davidson & Mohsini 1987, Mohsini 1984, Mohsini 1989, Mohsini & Davidson 1986, Pretorius & Taylor 1986). It was found that the aggregate performance in the traditional building process is primarily affected by two factors:

* The sufficiency of the starting information; and
* The extent of tasks' interdependence (inversely related).

In addition, it was also found that:

* The time required to procure more information affects cost performance;
* The clarity of scope of participation and time to procure more information affects time performance; and
* The extent of specialisation affects quality performance.

Whilst the findings of this study could well be supported by practical experience, the importance, as related to this research, is the conceptual basis of the model. The domain for the model development is inter-organisational conflict. This makes it extremely interesting as it triggers the thoughts in the potential linkage between project performance and dispute resolution satisfaction. Conflict is one of the three ingredients of contractual disputes.

The focus of this research is on satisfaction as related to dispute resolution. This initiation mainly arises out of the concerns, as evidently expressed by the construction industry in the last two decades, regarding the spread of the dispute epidemic (NPWC 1990, Latham 1994).

2.2 Research Related to Construction Disputes

Studies relating to resolving construction disputes fall in two main types: preventive measures and resolution process improvements. These two categories lie at the two ends of a continuum. The studies on preventive measures deal with risk sharing, anticipation of contingencies and implementation through contract documentation. The resolution process improvement route mainly involves the use of alternative dispute resolution techniques. Both approaches have their own problems. The former approach usually has led to an unhealthy scene of one-sided risk shifting, usually unilaterally towards the main contractors. The latter movement has been seriously hampered by the fact that ADR is not part of the mainstream legal system and also the non-conclusiveness of the decisions of the neutral.

There have also been other efforts seeking to improve record documentation and claim analysis, mostly to improve the information systems, so as to facilitate:

1. Identification of trouble spots;
2. Analysing the extent of delays;
3. Documenting records.

For example, Alkass, Mazerolle, Tribaldos and Harris (1995) developed an expert system to assist in improving the process of delay analysis, thus reducing the cost of claims preparation. The Isolated Delay Type (IDT) technique (Alkass, Mazerolle & Harris 1996) addresses some critical aspects in relation to delay claims. These include the treatment of concurrent delay and the use of float time by both parties.

There remains a gap in the study of dispute resolution, and that gap is the lack of a holistic view of the factors that would affect dispute resolution. It is then the purpose of this research to identify these discriminating factors that would affect dispute resolution. Drawing on these factors, a predictive model will be developed to serve as a forewarning device for project participants.

2.3 Dispute Resolution and Project Satisfaction

As discussed earlier, project success is usually gauged by the achievement of time, cost and quality attained. Frequently, the measurement of such success is based on the final outcome of these triple constraints, and this type of measurement places all the emphasis on the final outcome of the project in terms of time, cost and quality. Nevertheless, the process through which these objectives are achieved is often neglected and to a certain extent ignored. Project success as measured by satisfaction addresses the often neglected issues.

Resolving disputes has become part of routine management functions for project participants. In this regard, dispute resolution satisfaction as a measure of project success is of significance. In actual fact, dispute resolution has a definite impact on the attainment of the project objectives. Satisfactory dispute resolution reduces antagonism and uncertainty, thereby improving working relationships. These all contribute positively towards project success. This view is well supported by the senior personnel with whom interviews were conducted during the pilot study. Strong views were held by the interviewees that disputes should be resolved at the site level and by the project personnel. Almost all disputes are triggered in some way by happenings on site and the people directly involved in those happenings are obviously the most appropriate people to handle and resolve the dispute.

2.3.1 Definition of Dispute Resolution Satisfaction (DRS)

Construction is a complex process that can confound the most intricate management systems. It requires the co-ordinated effort of a temporarily assembled task force of many independent participants, each having a different speciality, and each expecting to make a profit. This complexity inevitably creates problems; no design can ever be perfect; construction is not an exact science; unanticipated events can always be expected. If problems are not resolved promptly, they can cause delays in the project, harm co-operative relationships, reduce efficiency, lead to claims and disputes, and probably worst of all, litigation. The keys to a successful project include taking advantage of the existing tools for preventing and resolving disputes. Groton (1992) provides seven guidelines for a successful construction project. These guidelines outline the concepts for the development of a Continuum Model for Construction Dispute Resolution.

1. Even when problems turn into disputes, litigation should not be the method used to resolve them.

2. If participants commit in advance to use dispute resolution techniques when problems arise, they create an atmosphere conducive to solving problems.
3. Many problem-prevention and litigation avoidance approaches exist; these techniques are most effective when applied early in the project.
4. Establishing a co-operative project environment prevents disputes.
5. Job-site dispute resolution techniques help to dispose of problems at the time they arise.
6. Mediation or any other non-binding dispute resolution technique should be attempted before resorting to conventional arbitration.
7. Conventional arbitration proceedings should be conducted expertly and efficiently.

'Prevention is better than cure', a famous Chinese saying, is the key to prevention techniques. The key to the success of prevention techniques is anticipation: a fully conceived design that anticipates site conditions and a contract that anticipates events or conditions which may lead to disputes.

However, if prevention fails, the dispute has to be resolved. The following figure 2.1 shows a continuum model for construction dispute resolution. The continuum model in Fig. 2.1 displays the typical sequential treatment used to resolve construction disputes, starting from negotiation, then stepping up to litigation as the case develops. According to the experts in this field, project dispute resolution satisfaction can be defined as:

Good: if the largest dispute is resolved at site level;

Bad: if the largest dispute has to be resolved beyond site level.

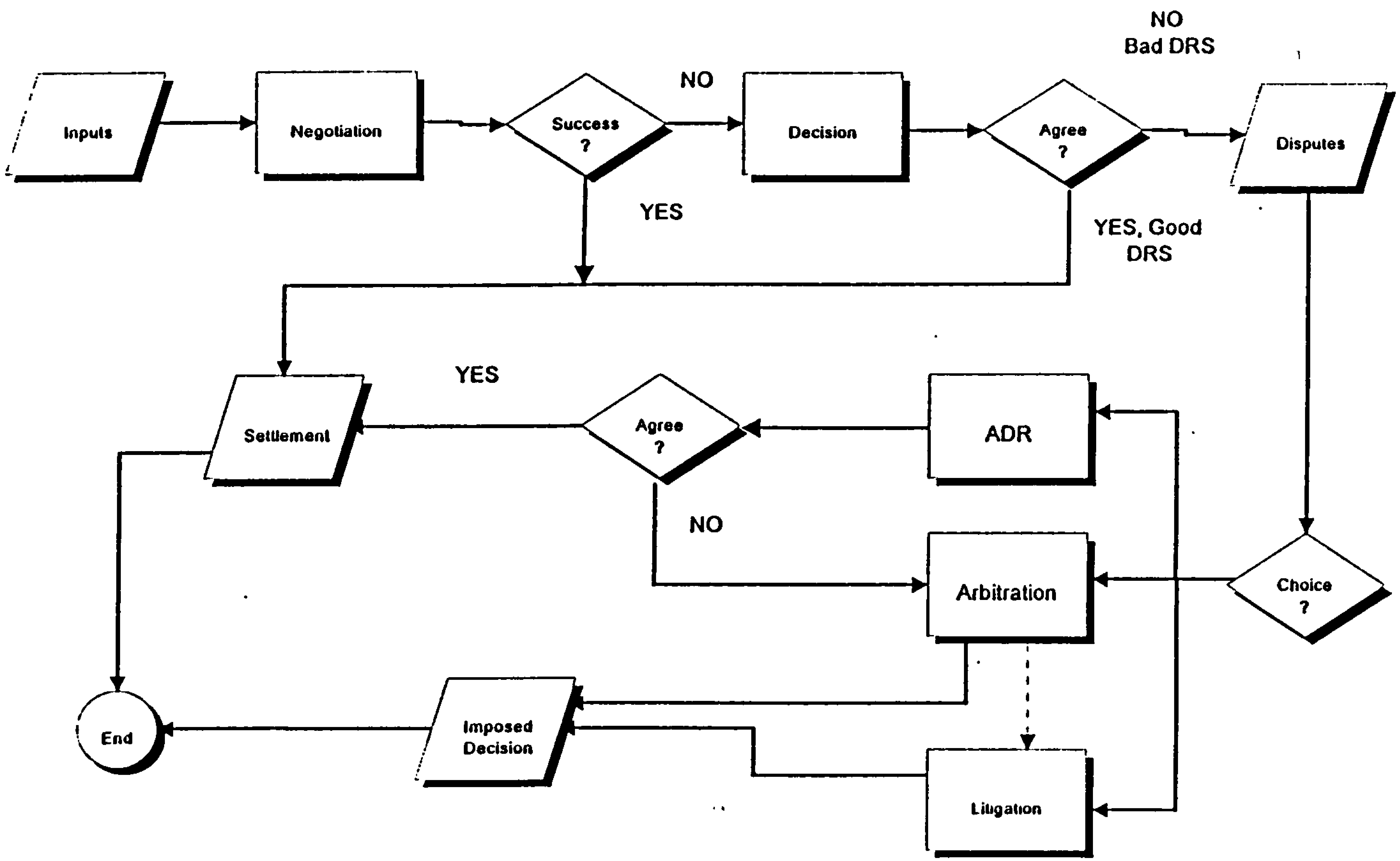


FIG. 2.1: A Continuum Model for Construction Dispute Resolution

2.4 Objectives and Aims of the Research

The objective of this research is thus to identify the discriminating factors that lead to success in dispute resolution, as measured by the level of dispute resolution satisfaction. The measurement is by way of reference to the process through which the largest dispute got resolved, i.e. if the largest dispute get resolved through negotiation between project personnel, then the project dispute resolution satisfaction is classified as good. However, if the involvement of a third party (as in most ADR processes) is required, or more formalised procedures such as arbitration and litigation are necessitated, then the project dispute resolution satisfaction is classified as bad. This research also seeks to provide a forecasting tool to enable clients to assess the possibility of a successful dispute resolution from their viewpoint.

If project participants can predict, with reasonable accuracy, the probability of success in dispute resolution, they can take steps to:

i) Avoid unsuccessful dispute resolution;

ii) Identify a good project (in terms of dispute resolution) worth pursuing;

iii) Identify problems on current projects and take corrective action.

Anticipation of problems is one of the foundations for project success (Barnes and Wearne 1993): "Success is more likely if technical and project experience from previous projects are drawn on deliberately, from wherever available. It comprises making plans in order to explore the options, foresee the potential risks, and be prepared to change some or all the plans. It comprises thinking through how an organisation should work in reality, not in diagrams, and designing contracts which suit real people with the real motives and their real contributions to meeting the objective."

The prediction tool can also be used as an evaluation tool. The need for evaluation is pressing under the current trends of multiple project participants. Downsizing of organisations, outsourcing of work packages, partnering to minimise disputes, and joint-venturing to synergise resources all require the assessment of prospective parties by each other. For example, perspective joint-venture partners must assess the compatibility of each other's short and long-term objectives, the complementarity of their resources, as well as the potential problems and synergistic benefits of working together (Kumaraswamy 1994).

This equally applies in situations where satisfaction in relation to dispute resolution is considered. Resolving disputes involves two parties. The compatibility of the parties in connection with resolving disputes that may arise would definitely affect the prospective dispute resolution satisfaction.

In sum, resolving a construction dispute can be problematic and consumes valuable resources. Total elimination of disputes is virtually impossible. Hence it makes both academic and commercial sense to direct management efforts towards improving the resolution process. The primary aim of this research, therefore, is to provide a thorough understanding of construction dispute resolution in a holistic manner. This includes the identification of critical factors affecting the outcome of a dispute resolution process and the development of a forewarning device to predict project DRS. It is believed that with such enhanced understanding, together with a predictive tool, management is more prepared to tackle the thorny issue of construction dispute.

In this context, the detailed objectives of this research are:

- To provide a conceptual definition of construction disputes.
- To identify the potential factors that may affect dispute resolution outcome.
- To provide a conceptual framework for the factors identified.
- To develop a systematic and structured method for collecting project data.
- To develop a quantitative model for the prediction of DRS.
- To identify the discriminating variables that distinguish good and bad DRS projects.
- To draw clients' attention to the attribute that would improve DRS.

In order to achieve these aims and objectives, a literature review and pilot study were performed to develop the conceptual framework and the data collection questionnaire. Multivariate discriminant analysis (MDA) and a multi-layer perceptron (MLP-a type of artificial neural network) were used to develop the quantitative model. These modelling techniques also enable the identification of critical factors that affect the outcome of a dispute resolution process. The MDA and MLP models are described in detail in Chapters Six and Seven respectively. The reliability of the models was tested by the Relative Importance Index (RII) method.

CHAPTER THREE
MULTIVARIATE DATA ANALYSIS MODEL

3.1 Predictive Modelling

Predictive modelling assists management by making them aware of potential problems. This enables preventive and/or corrective measures to be implemented. In general, a structured and systematic approach in handling these sorts of uncertainties will improve the quality of decision if made simply on the basis of intuition and subjective judgement.

In a study of the motivation factors of bricklayers, Olomolaiye (1990) identified that there exists a relationship between productive time and motivation variables. A multivariate regression analysis was conducted to predict the percentage of productive time. The predictive model so developed also allows the assessment of the percentage variance that is accounted for by the motivating variables used in the prediction of percentage productive time.

In another study of client–generated risks towards project consultants (Kometa, Olomolaiye & Harris 1995), a prediction of risk exposure allows the project consultant to assess the type of risk management strategy used to deal with such risks.

Predictive models have been developed to predict contractor failure (Russell & Jaselskis 1992b). Three categories of variables are considered in the model: project characteristics, owner characteristics and contractor characteristics. The quantitative tool developed could be used in an absolute or relative sense. In absolute terms, the prediction of failure can be used at face value for determining the project outcome. In a relative sense, one can ask a question about the effect of changing the value for each variable and observing its impact on the probability of experiencing a contractor failure.

The predictive technique described above has further been applied to predict the probability of a client claiming against surety provided by contractors (Severson, Russell & Jaselskis 1994). The predictive variables used are financial ratios obtained from the balance sheet together with other variables that would reflect the construction characteristics. In this case, the inclusion of the variable indicating whether a contractor had implemented a cost monitoring system was found to considerably improve the model.

If the choice of contractor for the work affects the project outcome, it would then be just logical to investigate ways of identifying the right contractor for the job. Pre-qualification is the logical start. Jaselskis and Russell (1992) use a decision tree approach to model the evaluation exercise for use in the selection of contractor assessments. It was found that a detailed pre-qualification exercise, which includes the solicitation of financial data and a request for references, together with the requirement of a surety bond, reduces the chance of failure of a contractor. The model has been criticised for the heavy reliance on subjective assessments by industrial experts.

Contractor performance can be predicted by examining attributes of the contractors (Tam 1993, Tam & Harris 1996). The attributes used are mainly objective in nature and are less reliant on subjective assessment as used by Jaselskis and

Russell (1992). The model can also be used to assist clients in vetting contractors during the pre-qualification stage of the project.

It can be noticed that in the prediction of project outcome, research has centred on assessments of the contractor. There appears to be a presumption that careful selection of the contractor will produce a desirable project outcome. Much of the work also approaches the issue from a clients' perspective.

A predictive model closest to the topic of dispute resolution can be found in the work of Diekmann and Girard (1995). Logistic regression was employed to derive a discriminant function for predicting the likelihood of legal disputes. The model so developed can provide the project team with foreknowledge of a project considered as having a high propensity toward contract disputes. The variables considered in the model development were categorised as: people–related, project–related and process–related.

References	Prediction	Variable Type			
		Owner	Contractor	Project	Process
Russell & Jaselskis (1992b)	Contractor Failure	•	•	•	
Tam (1993) Tam & Harris (1996)	Contractor Performance		•	•	
Diekmann & Girard (1995)	Occurrence of Contractual Disputes	•	•	•	•

Table 3.1: Types of Variables in Predictive Models

Prediction of contractual disputes allows improvement via the timely introduction of preventative measures. However, preventative measures cannot guarantee total dispute elimination. In addition to preventing disputes from arising, it would also be to the benefit of all parties to a project if a forewarning of whether a dispute can be amicably resolved if contract disputes do arise is available. This is one of the objectives of the current study. Table 3.1 summarises the predictive models mentioned above and the type of variables studied.

3.2 Multivariate Discriminant Analysis

Multivariate discriminant analysis is the appropriate statistical technique when the problem involves a categorical dependent variable and several independent variables. Typically, the dependent variable consists of two groups or classifications, for example, male versus female, or high versus low (Hair, Anderson, Tatham & Black 1995).

In other instances, more than two groups are involved, such as a three–group classification involving low, medium and high. Multivariate discriminant analysis is capable of handling either two groups or multiple groups (three or more).

Multivariate discriminant analysis involves deriving a variate, i.e. the linear combination of two (or more) independent variables that will discriminate best between a-*priori*–defined groups. Discrimination is achieved by setting the variate's weights for each variable to maximise the between-group variance relative to the within-group variance. The linear combination for a discriminant analysis, also known as the discriminant function, is derived from an equation that takes the following form:

$$Z = a_0+a_1x_1+a_2x_2+...+ a_nx_n \qquad \text{(Equation 3.1)}$$

where

Z = Discriminant score

a_o = Constant

a_i = Discriminant weights for variable i

x_i = Independent variable i.

The test for the statistical significance of the discriminant function is a generalised measure of the distance between the group centroids. It is computed by comparing the distribution of the discriminant scores for the two or more groups. If the overlap in the distribution is small, the discriminant function separates the groups well. If the overlap is large, the function is a poor discriminator between the groups.

Financial ratios provide invaluable information about the financial position of a company. The use of financial ratios to develop predictive models through the use of discriminant analysis has been well documented (Altman 1968, Beaver 1966, Blum 1974, Deakin 1972, Edmister 1972, Ohlson 1980). However, these studies are not specifically related to the construction industry.

Abidali and Harris (1995) used discriminant analysis to identify seven discriminant financial ratios that are critical in the prediction of company failure in the construction industry. These variables are profitability, financial leverage, activity/net asset turnover, liquidity and three others related to trend measurement.

This study focused on trends in the movement of the financial ratios, these potentially being symptoms of failure.

Tam (1993) used discriminant analysis to construct a predictive model for predicting contractor performance. The model can be used to assist in the vetting of contractors during a pre-qualification stage.

The followings are some examples where classifying subjects into groups is of practical interest (Stevens 1996):

1. A bank wants a reliable means, over a set of variables, of identifying low–risk vs. high–risk credit customers.
2. A reading diagnostic specialist wishes for a mean of identifying in kindergarten those children who are *likely to* encounter reading difficulties in the early elementary grades from those *not likely to* have difficulty.
3. A special educator wants to classify handicapped children as either learning disabled, emotionally disturbed, or mentally retarded.
4. A Dean of a law school wants a means of identifying those *likely to succeed* in law school from those *not likely to succeed.*
5. A vocational guidance counsellor, on the basis of a battery of interest variables, wishes to classify high school students into occupational groups (artists, lawyers, scientists, accountants etc.) whose interest are similar.
6. A clinical psychologist or psychiatrist wishes to classify mental patients into one of several psychotic groups (schizophrenic, manic-depressive, catatonic, etc.).

The above situations all involved the desire of the decision maker for a reliable quantitative tool to assist in making crucial decisions. In the case of a developer, he would obviously find a tool that would help in identifying good vs. bad projects in terms of dispute resolution satisfaction of practical value.

3.3 The Approach in this Research

Project dispute resolution satisfaction is classified into two groups, Good or Bad, according to the resolution process of the largest dispute and defined as:

Good - resolved at site level

Bad - resolved beyond site level

Let $X' = (x_1, x_2, x_3, \ldots\ldots, x_p)$ denote the vector of measurements on the basis of which we wish to classify a project into one of the two groups :

G_1 (Good Dispute Resolution Satisfaction)

G_2 (Bad Dispute Resolution Satisfaction)

In a two–group situation, a single discriminant function is sufficient. It is assumed that the two populations are multivariate normal and have the same covariance matrix.

Theoretically, the larger the number of samples the better the discriminant function. However, the factors that may affect dispute resolution satisfaction involve sensitive information like budget constraints, variation accounts and most importantly how the largest dispute get resolved. Such information are considered as confidential and not suitable to be released by many organisations. This posed practical difficulties in obtaining a very large sample. In this regard, a wide range of client organisations was approached for assistance and a total of 61 project data sets were obtained. Out of the total of 61 projects, 42 projects were classified as having good dispute resolution satisfaction, while 19 were classified as bad according to the definitions of Good DRS and Bad DRS projects offered in the above paragraph. These classifications were used as the basis for comparison with the classifications derived from the models developed. Twenty percent of the data was reserved as the hold out sample to be used to validate the discriminant function. It was also desirable to have the model development sample and the hold-out sample having the same proportion of good and bad dispute resolution satisfaction. Based on the above arrangements, the model development sample was made up of 33 good dispute resolution satisfaction projects and 15 bad dispute resolution projects. For the hold-out sample, the composition was 9 and 4 for good and bad projects respectively.

The statistical package SPSS was used as the tool. The remaining thirteen project data was used as a hold-out sample, which was be used for the validation of the discriminant function so derived.

Let $Z = a_0 + a_1x_1 + a_2x_2 + ... + a_nx_n$ denotes the discriminant function,

Where $a' = (a_1, a_2, ..., a_n)$ is the vector of coefficients.

Let $\bar{X}_1$ and $\bar{X}_2$ denote the vectors of the means for the projects on the n variables in groups 1 and 2.

The location of group 1 on the discriminant function is then given by :

$\overline{y_1} = a' * \bar{X}_1$,

and the location of group 2 by:

$\overline{y_2} = a' * \bar{X}_2,$

The mid-point between the two groups on the discriminant function is then given by:

$m = (\bar{y}_1 + \bar{y}_2) / 2.$

If we let Z_i denote the score for the ith project on the discriminant function, then the decision rule is as follows:

If $Z_i \geq m$, then classify project in group 1.

If $Z_i < m$, then classify project in group 2.

Graphically, this can be represented as Figure 3.1.

For a two–group classification, a good separation between the two distributions is considered a good result (the basic operation of discriminant analysis is to maximise between–group variance and minimise among–group variance). A overlapping of the distribution represents incorrect classification.

Assessing the overall fit of the derived discriminant function is by way of constructing a classification matrix for the comparison of a classification by the function with the dispute resolution satisfaction as defined. Hit rates refer to the number of correct classifications. The classification procedure is set up to maximise the hit rates. A good discriminant function should exhibit a high hit rate.

Validation of the discriminant function was also carried out by applying the function to the hold–out sample. This procedure avoids the occurrence of an upward bias in prediction accuracy if the data used in developing the discriminant function is used also in the construction of the classification matrix.

The aforesaid approach is presented in Figure 3.2.

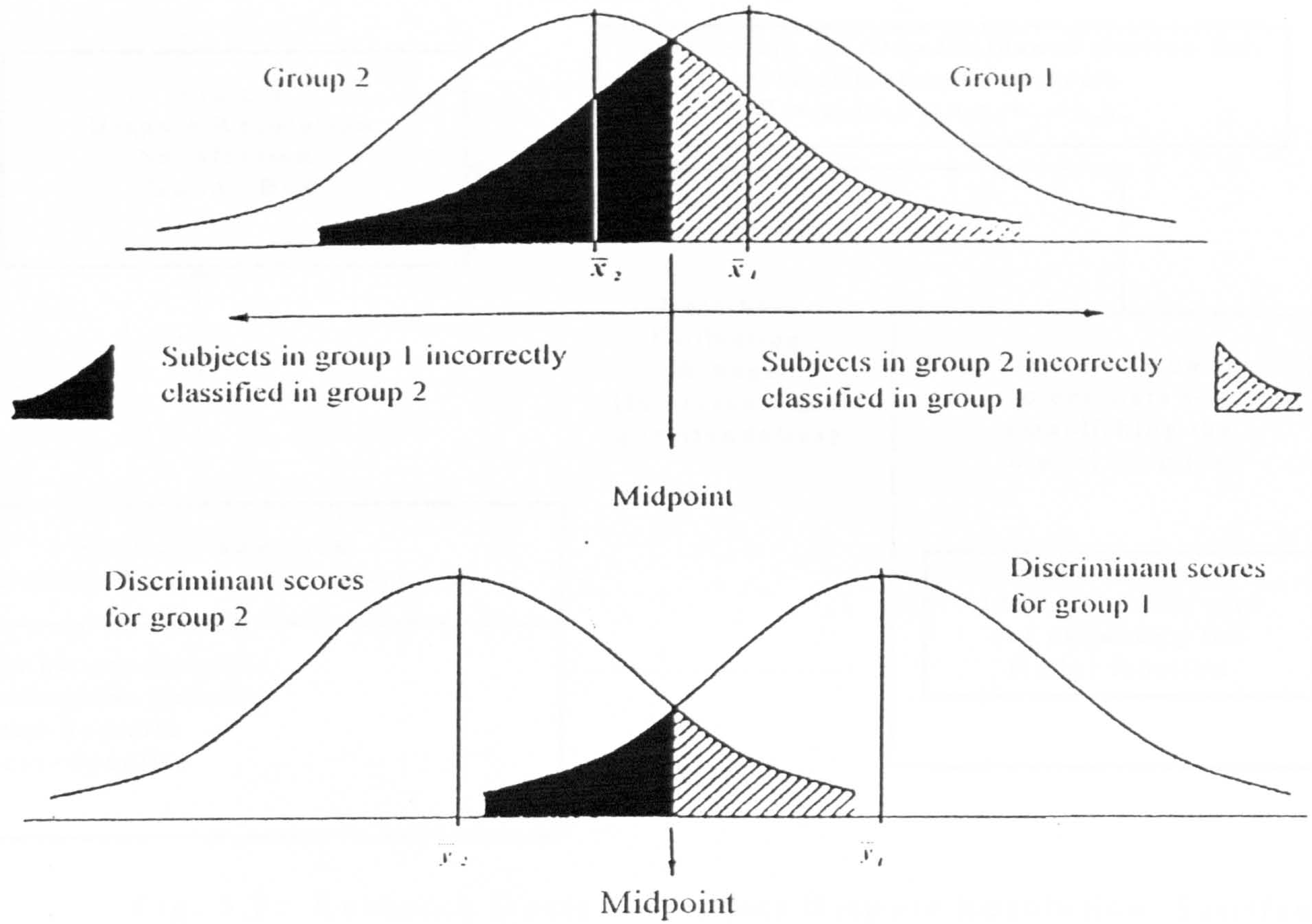


Fig. 3.1: Two–Group Classification by Discriminant Analysis

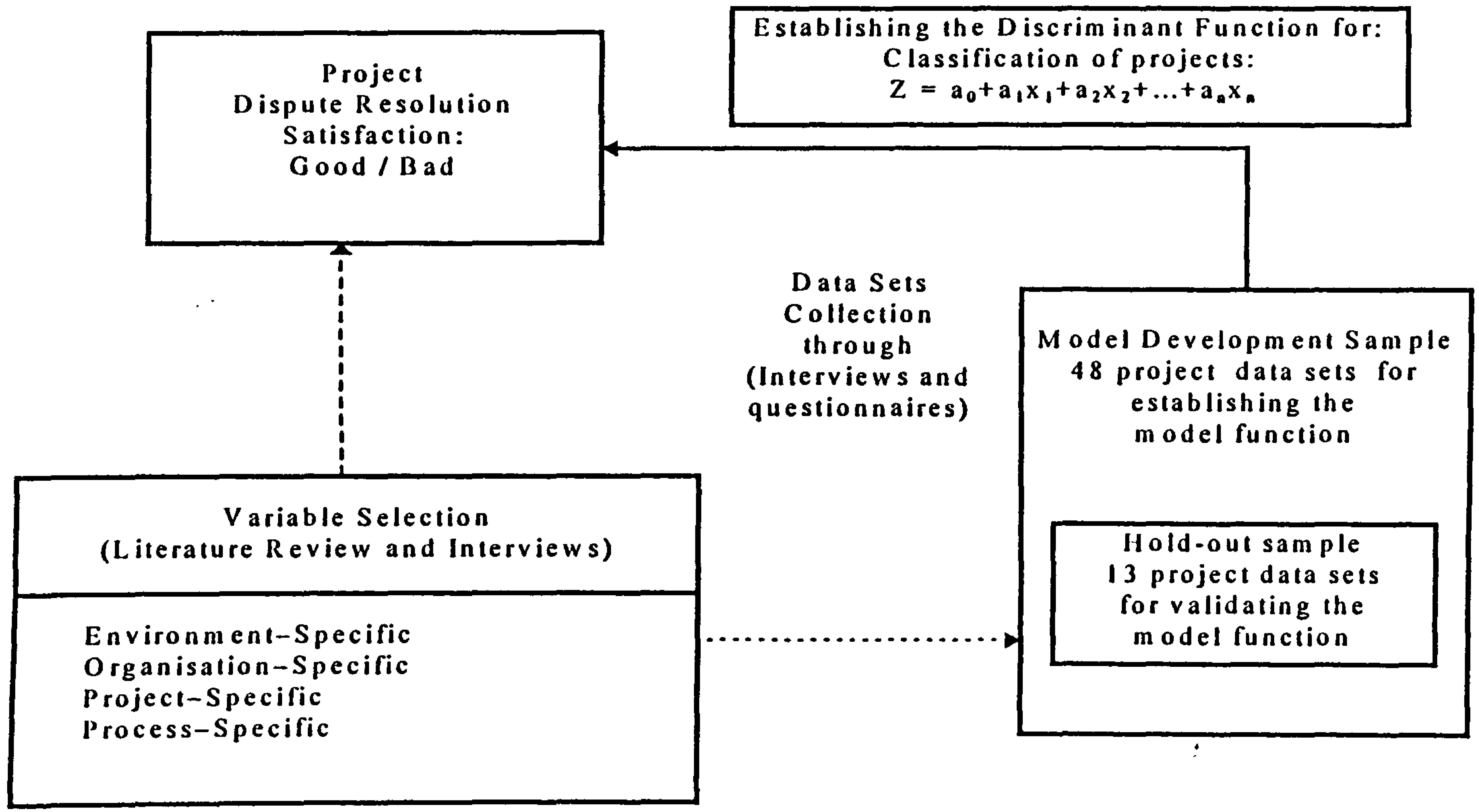


Fig. 3.2: Research Design - Project Dispute Resolution Satisfaction of Construction Clients in Hong Kong

CHAPTER FOUR
RESEARCH DESIGN

4.1 Selection of Variables

One of the objectives of this investigation is to develop a tool for predicting project dispute resolution satisfaction (DRS) based on multivariate discriminant analysis, which requires project data for the derivation of a discriminant function. Project data was to be collected through structured interviews with the use of a detailed questionnaire. The construction of the questionnaire starts with the selection of variables, which was carried out through two main channels; a literature review and expert opinions. The selection of variables through literature review requires a systematic schema. There must have been a dispute before resolution is necessitated, hence the causes of disputes were examined. As most disputes are related to the performance of the contract, in this context, factors affecting the performance of the contract were also studied. Experts' opinion compliments a literature review, bringing in local characteristics and reflecting the current industry view. A pilot study was also conducted to test the sustainability of the questionnaire devised. As a result, a questionnaire for the data collection was developed.

4.2 Factors Affecting Dispute Resolution Satisfaction (DRS)

The enlisting of variables is systematically considered from three perspectives:

1. Through the examination of causes of contractual disputes;

2. Through the examination of factors affecting the performance of the project, this includes performance of the various parties involved in the project development.
3. Expert opinions.

4.2.1 Causes of Contractual Disputes

In the search for factors that would affect dispute resolution satisfaction, a review of the causes of dispute seems to be a logical start. Jahren and Dammeier (1990) undertook a study investigating the causes of construction disputes. The study was conducted through interviews with designers, contractors and attorneys in the construction industry in the United States.

It was found that many construction disputes arise because society is averse to accepting the results of risky situations. Instead of accepting these bad results, citizens often file lawsuits. Construction is a risky business where bad results are probable. In a similar context, disputes arise frequently when bad results eventuate. Evidently, this adverse attitude is closely related to the cultural background of the business organisations involved. For instance, it has been suggested that resolving a dispute in a Chinese style is less prone to arbitration and litigation (Caldwell 1991, Chau 1990, Lim 1993, Yang 1992). In short, construction disputes are inherent in every construction project because of the high risk nature of construction. Also, the cultural background of the disputants may have an important bearing on the way that dispute is resolved. This cultural factor was taken into account in a contractor vetting model (Tam 1993, Tam & Harris 1996) where the origin of the contractor organisation was found to be a discriminating factor in predicting contractor performance in Hong Kong. This regional characteristic should not be neglected.

Some other findings of the work of Jahren and Dammeier (1990) were:

1. It was clear that it was almost unanimously agreed by all groups of respondents that the primary source of disputes is changed conditions.
2. The involvement of attorney (legal consultant) was recommended only in providing advice after a dispute has arisen.
3. With regard to the dispute resolution process, arbitration remains the preferred choice.

These findings carry some important implications. Point one implies that the best way to avoid dispute is to keep changes to the minimum. However, with the use of parallel working and fast track contracting practices being the fashion in the industry, changes during construction stage appear to be discernible.

The problem with changed conditions can also be supported by another study. Ibbs and Ashley (1987) identified that most troublesome contract clauses belong to a family of change clauses: construction changes, design changes, workmanship variation, design rework and work scope definition. Change clauses are included in a contract purposely to cater for possible changes that are necessitated during the construction stage. This adaptatory function, as suggested by Cheung and Lenard (1997) is crucial where adjustments to the contract boundary is desired. Project participants find change clauses most troublesome, probably because of the high frequency that these change clauses are triggered and the difficulties that arise in the application to the problem. A typical problem is whether the change required is covered by the contract.

The recommendation that the involvement of a legal consultant should only be used after a dispute has arisen suggests that regular service of a legal consultant may obstruct negotiation and their presence often fuels the adversarial tension. This suggestion would be examined in this study.

The preference to use arbitration is interesting, despite current literature indicating favour for the use of the alternative dispute resolution processes. The effectiveness and effect of incorporating alternative dispute resolution in construction remains to be investigated.

A comprehensive study on the causes of disputes was conducted in the late eighties in Australia. The Australian construction industry commissioned a study on strategies to reduce claims and disputes. The report so produced (NPWC 1990) highlighted the following causes of disputes:

* Inefficiency in design and performance;
* Aberrations in tendering, i.e.
  - under-bidding
  - failure to cost known risks
  - obscure contractual obligations
* Nomination
* Site possession & approval;
* Site conditions;
* Job instruction;

* Variations;
* Principal's or principal's agents acts, defaults or omissions;
* Interdependencies;
* Delay and disruption;
* Acceleration;
* Breach of contract;
* Financial pressure;
* Insolvency.

It can be noted that the causes listed above can broadly be classified into errors (by either or both parties to the contract) and changes. Errors are mainly attributed to the capabilities of the parties. Changes are mainly the result of clients' change of mind.

Communication breakdown is another major cause of disputes (Stewart 1992). Communication breakdown creates bottlenecks, increases tension between the project personnel and most significantly destroys trust among the project participants.

In sum, the high-risk nature of construction lays the seedbed for disputes. Disputes are mainly related to errors or changed conditions. This equally applies to both client and contractor organisations. Communication is a key success factor in construction projects where a complex flow of information is almost a daily routine. These variables will be studied in this study. A tabulated summary of the aforementioned research findings is presented in Table 4.1.

References	Causes of Contractual Disputes
Jahren & Dammeir (1990)	Changed Conditions Involvement of claim consultants/attorneys
NPWC (1990)	Inefficiency in Design and Performance Aberrations in Tendering, i.e. - under-bidding - failure to cost known risks - obscure contractual obligations Nomination Site Possession & Approval Site Conditions Job Instructions Variations Principal or Principal's agent act , default or omissions Interdependence Delay and Disruption Acceleration Breach of Contract Financial Pressure Insolvency
Ibbs & Ashley (1987)	Construction Changes Design Changes Workmanship variations Work Scope definition Design Rework
Stewart (1992)	Communication breakdown Late changes

Table 4.1: Causes of Contractual Disputes

4.2.2 Factors that may affect Project Performance

The next search for factors that may affect dispute resolution satisfaction focuses on the factors that may affect project performance.

Pre-qualification processes are in place as a check by the employer on the ability of the contractor to complete a project. It serves as a screening device guarding against failure of performance. The objectives of a project sponsor would be seriously jeopardised if the contractor for the work fails. In a study of the impact of carrying out contractor evaluation on project outcome (Russell & Jaselskis 1992a), it was found that contractor failure is more likely to occur when:

* A project is small in size;
* Involves contract documents that are poorly conceived;
* Involves an owner that has not worked previously with the contractor;
* Involves an owner that expends minimal effort up front to evaluate the contractor's suitability to perform work associated with the project;
* Involves no monitoring of schedule performance or funds paid to the contractor more than the amount of work actually completed.

Russell and Jaselskis (1992a) identified that for projects involving contractor failure (failure was defined as a significant breach of the contractor's legal responsibilities to the owner, examples of such failure including bankruptcy or material breach of contract related to meeting the desired project objectives, such as cost, schedule and quality), a high percentage of design errors and omissions was experienced, causing interruptions to the construction process, hence giving rise to claims and disputes. The findings of this research provide valuable information for the design of the pre-qualification process.

Russell (1990) suggests a three tier contractor pre-qualification process. Firstly, contractors are preliminarily screened on references, reputations and past performance. Secondly, the resources of the contractor are considered. The factors to be considered include financial stability, status of the current work programme and technical expertise. The third tier relates to project specific criteria and is mainly designed to determine whether the contractor fully understands the scope and nature of the work that is being sought. This presents a proactive approach to ensure that the selected contractor would have the ability, in terms of resources and experience, to complete the project. A thorough understanding of the project requirement reduces chances that the contractor raises disputes to cover errors made in the tender.

On the other hand, contractors, in deciding whether to bid or not, will also examine some critical factors. Ahmad and Minkarah (1988) in their study of the contractor bidding process, found that contractors' decisions were mainly heuristic in nature and made on the basis of experience, judgement and perception. They developed a listing of thirty-one factors that contractors would consider in their decision to bid or not. It was found in their study of the top 400 general contractors in the United States, that out of the 31 factors, the top three rankings are:

1. Type of job;
2. Need for work;
3. The owner.

As construction projects have become more complex and specialised, so have the contractors, the matching of the contractor's expertise with the type of work under consideration therefore is vital. Another drive for tender is the contractor's need for work. More importantly, as related to dispute resolution satisfaction, is perhaps the identity of the owner.

The influence of the client in relation to the performance of other project participants was also investigated in another study (Kometa, Olomolaiye & Harris 1994, 1995, 1996). The study investigated the relationship between construction clients and the performance of project consultants. Ten major attributes were identified by project consultants considered to be significant to their performance. These included:

* Financial stability
* Project feasibility
* Past performance
* Project characteristics
* Client's duties
* Organisational quality
* Past experience
* Quality of management
* Current market conditions
* Clients characteristics

In overall terms the client's experience, resources, management know-how and attitude all have a bearing on the performance of the consultants.

Apart from the influence of participants, the characteristics of the project itself cannot be overlooked. The importance of complexity to project management is widely acknowledged. Baccarini (1996) summarises in the following terms:

* Project complexity hinders the clear identification of goals and objectives of major projects.
* Complexity is an important criterion in the selection of an appropriate project organisational form.
* Project complexity influences the selection of process inputs, e.g. the expertise and experience requirements of management personnel.
* Complexity is frequently used as a criterion in the selection of a suitable project procurement arrangement.
* Complexity affects the project objectives of time, cost and quality.

Classification of complexity is not straight forward. A simple classification into normal; complex and singular is offered by Santana (1990). Singular refers to unique construction carried out sporadically, with very long periods of planning and execution. Complex refers to most industrial projects and the class of normal construction include all the other projects such as buildings, roads and earthworks. While such a classification may not assist the present analysis, it brings out the importance of categorising projects according to the complexity of design and construction.

In sum, projects have certain critical characteristics that determine the appropriate actions to manage them successfully and project complexity is one such project dimension.

Attention is now turned to the instrument that governs and regulates the parties' obligations and responsibilities. Construction contracts are instruments for recording obligations and can be used to ensure performance. As the project objectives are often expressed in the contract documents, the quality of the document will have a significant impact on project performance. In a study of the impact of contract clauses on project performance (Ibbs & Ashley 1987), both owners and contractors were asked to indicate the existence and extent of ties between a particular contract clause and project performance. The study identified some of the most troublesome contract clauses:

* Construction changes
* Design Changes
* Workmanship variations
* Work scope definition

All of the above relate to a family of change clauses. It was further suggested that disputes involving change clauses seemed to affect project performance negatively (Ibbs & Ashley, 1987).

The pivotal role of the general conditions has important ramifications for the likelihood and degree of project success in terms of cost, time, quality and the satisfaction of the contracting parties (Ibbs & Ashley 1987). Consequently, general conditions, whether standard or not, need to be viewed by both the project owner and the contractor as a source of project risk that needs to be assessed.

One essential quality required of the general conditions of a contract is the anticipation of potential trouble spots in the relationship between the contracting parties. Although not every contingency can be anticipated, well thought out contract conditions can aid in ensuring a smoother completion of the construction process (Currie & Dorris 1986).

In addition, the general conditions should promote the achievement of the more tangible dimensions of project success in terms of time, cost, quality and safety (Thompson & Perry 1992).

An evaluation tool for the conditions of contract developed by Bushait and Almohamis (1994) includes the following attributes:

* Clarity:	Free of ambiguity
* Conciseness:	Concise and no superfluous material
* Completeness:	Comprehensive
* Internal consistency:	Consistency within the Conditions of contract
* External consistency:	Consistent with other documents
* Practicality:	Practical to implement
* Fairness:	Fair to both owner and the contractor
* Quality:	Promote quality
* Time:	Promote completion within schedule
* Cost:	Promote completion within budget
* Safety:	Promote completion without major accident or injury

These attributes of conditions of contract fit comfortably and work in parallel with the pre-qualification objective that contractors should be clear about the scope and extent of work to be executed and the risks involved. Well-prepared contract documents neatly serve this purpose.

Relying singularly on pre-qualification cannot guarantee that a project will achieve a successful conclusion. As construction work is of a type that requires inputs from both the contractor and the client, apart from the performance of the contractor, the decisions made by a client in setting up a project and the degree of involvement in the project can have significant effects upon construction project performance (Bresnen & Haslam 1991).

A client will be bitter if unable to get the system desired (Plant 1989). In order to achieve what they need, construction clients must clearly establish their objectives. The initial setting up of clear objectives does not guarantee success as these objectives may change during the course of the project. Hence clients' involvement during the project will prove crucial in the development and reappraisal of objectives during construction.

The relationship between client involvement and project results are further augmented by various writers. Thrush, Dickmann and Wilson (1987) conclude from their study that "Owners who exercise close involvement seem to be the most satisfied with their project results. .... Heavy client involvement was a key factor in successful projects."

Dunnam (1984) reports that "one way of successfully dealing with the many constraints that can arise during the life of the project is to keep the owner so close to the project status and involved in the decision making process that they understand the impact of each deviation and, with full understanding, accept the necessary adjustments".

Wheeler (1987) emphasises the importance of the owner's involvement during the project construction process: "The most important people in a construction project should always be the client and the associated organisation".

Halpin and Woodhead (1980), in their study, emphasise the impact of an owner's involvement in the design phase towards construction: "The owner involvement in the design phase improves the technical saving in project cost and time by eliminating contract modification during the construction phase". This was reinforced by a study of owner involvement in construction projects in Saudi Arabia (Bubshait & Al-Musaid 1992). Furthermore, the study identified five areas of heavy client involvement during construction namely:

1. Taking the necessary precautions to prevent the loss of project data.
2. Enforcing quality and safety control on the project.
3. Resolving claims.
4. Conducting regular visits to the project site.
5. Monitoring the construction operation, cost and schedule.

Point three is of particular relevance to the present study. The importance of client's responsibility in ensuring that participants to a project are committed to making the contract work rather than getting involved in litigation, was confirmed in a study of U.K. clients (Kometa, Olomolaiye & Harris 1995).

The relationship of client involvement and project success is further extended to the importance of top management support within the client organisation

(Thompson 1991). It is suggested that there exists an inherent incompatibility between the client organisation, as an ongoing entity, against the temporary–natured project team. In this respect, support from top management is vitally needed. Furthermore, this support should be delegated to personnel involved in the project.

Successful project performance depends on the mutual effort of clients and contractors. Trust is necessary for the construction process to operate efficiently and effectively. The effect of trust on successful project completion is founded on the idea that project teams require people of different backgrounds to work co-operatively. The level of trust underpins the functioning of such efficiency. The building of trust at the beginning of the project and the maintenance and improvement of the trust level during construction is of equal importance. The reciprocal and spiral (can be downward or upward) characteristics make the importance of ensuring trust non-debatable (Munns 1995).

Munns (1996) conducted a study to determine the entry level of mutual confidence for the parties involved in construction. It was suggested that by measuring the initial level of mutual confidence among the three main parties within a construction project, the development of a relationship could be predicted. A low level of trust suggests decline or even breakdown of relationships. If mutual confidence is shown to be low or non-existence at the start of a project, it would suggest that the resulting situational trust would also be low and could result in conflict between some or all of the parties.

References	Factors that may affect Project Performance
Ahmad & Minkarah (1988)	Decision to bid or not by contractors: * Type of job; * Need for work; * The identity of the owner.
Russell (1990)	Pre-qualification of Contractors: * Reputations and Past Performance; * Financial Stability; * Current Work Programme; * Technical Expertise; * Knowledge and Understanding of project requirements.
Russell & Jaselskis (1992a)	Contractors likely to fail if: * Project small in size; * Poorly conceived contract documents; * Owner having no relationship with the Contractor; * Minimal up-front evaluative effort on contractor's suitability for the work; * Lack of Control during Construction.
Tam (1993) Tam & Harris (1996)	Contractors' Performance: * Complexity of the Project; * Percentage of Professionally Qualified Staff; * Project Leader's Experience; * Contractor's Past Performance; * Origin of the Company; * Architect's or Client's control and Supervision during Construction.
Kometa, Olomolaiye & Harris (1994, 1995 & 1996)	Project Consultant's performance affected by: * Financial Stability; * Project Feasibility; * Past Performance; * Project Characteristics; * Client's Duties; * Organisational Quality; * Past Experience; * Quality of Management; * Current Market Conditions; * Client's Characteristics.
Bresnen & Haslam (1991) Dunnam (1984) Haplin & Woodhead (1980) Thompson (1991) Thrush, Dickmann & Wilson (1987) Wheeler (1987) Bubshait & Al-Musaid (1992)	Project Success: * Proportional to the involvement of the Client.
Munns (1995 ,1996)	Project Success: * Trust between the project participants.

Table 4.2: Factors that may affect Project Performance

It was also found that both client and contractor have a higher level of trust towards professionals than to each other. This suggests that the use of such professionals as architects, engineers & surveyors alike to break the low level of trust between the contractor and the client (Munns 1996).

The extension of such is the applicability of the use of ADR techniques. Theoretically, the use of ADR would improve the dispute resolution process and give a greater chance of obtaining dispute resolution satisfaction through the involvement of the third party neutral. A tabulated summary of the aforementioned research findings is presented in Table 4.2.

4.2.3 Expert Opinion

The factors detailed in the Sections 4.2.1 and 4.2.2 were used to prepare the original draft of the questionnaire. A pilot study with experts was then conducted. The experts confirmed the relevancy of the factors identified in the literature review but stressed that senior management involvement is the most imperative in terms of dispute resolution satisfaction. Protracted dispute negotiations are often the result of either the polarised positions of the parties (because the negotiation teams are composed of the people who actually created or caused the dispute), which prohibits settlement, or the fact that the negotiating team does not possess the authority or information to take a commercial approach to resolve the dispute. According to the experts, disputes involving technical details will not usually create difficulty. It is the by-product, such as the unveiling of incompetence and inadequacy, that imposes obstacles upon the resolution process.

4.3 Categorisation of Variables

The literature review and expert opinions enabled the listing of variables for inclusion in this study. In order to put these variables into perspective, a framework is necessary. On a macro level, the business environment of the industry should not be neglected. As disputes cannot be unilaterally resolved, two organisations (clients and contractors) need to be considered. Each project has its own characteristics, and hence project specific data will prove an insight. The process of dispute resolution itself may be most discriminating, hence process specific variables must be examined.

The following variable categorisations are therefore suggested:

Environment–specific;

Organisation–specific;

Project–specific;

Process–specific.

4.3.1 Environment–Specific Variables

Environmental factors refer to those that would have an effect on the overall well being of the project. These factors should not be so macro or general that they would affect the global economic environment. Such macro environment factors are of little value in prediction models (Kangari 1988). In this context, factors tending to be more reflective on the construction industry include:

* The Work Market
* Inflation

In the survey, the construction period for the projects was recorded and the corresponding data on work market and inflation was be obtained from government statistics.

4.3.2 Organisation–Specific Variables

Organisation–specific variables are attributes of client and contractor organisations, including:.

* Contractor Workload
* Contractor profit status
* Claim consciousness of contractor
* Contractor need for the work
* Contractor experience with the type of construction
* Client experience with the type of construction.
* Previous working relationship between the contractor and client
* Client budget constraint
* The origin of the contractor organisation
* The origin of the client organisation

4.3.3 Project–Specific Variables

Project–specific variables are those characteristics of the project under examination. Therefore, the following variables are included under the project–specific category:

* Design complexity

* Construction complexity
* Design changes
* Relationship between project personnel
* Degree of nomination
* Clarity of contract documents
* Project selection criteria
* Contractor selection process
* Conditions of Contract (risk allocation)
* Contractual obligations
* Client's involvement in the running of the project
* Power balance

4.3.4 Process–Specific Variables

Process Specific variables look into what influences the dispute resolution process. Therefore the following variables are included under the process–specific category:

* Senior management involvement (contractor)
* Senior management involvement (client)
* Claim consultant involvement (contractor)
* Claim consultant involvement (client)
* Alternative dispute resolution process
* Element of trust
* Motivation to settle (contractor)

* Motivation to settlement (client)
* Negotiation skill (contractor)
* Negotiation skill (client)
* Expectation of future work (contractor)
* Expectation of future work (client)

Figure 4.1 presents the framework of the categorisation proposed. The variables and their corresponding references are summarised in Table 4.3.

4.4 Questionnaire: Preliminary Design

Based on the variables selected through literature review, a questionnaire for data collection was prepared. Before launching a large scale data collection, a pilot study was collected to test the questionnaire's sustainability. A copy of the questionnaire devised is appended in Appendix A.

4.4.1 Pilot Study

A Pilot study was conducted through interviews with experts. The purposes of the pilot study were to:

1. Confirm the selected variables.
2. Solicit any omitted variables.
3. Test the sustainability of the questionnaire.

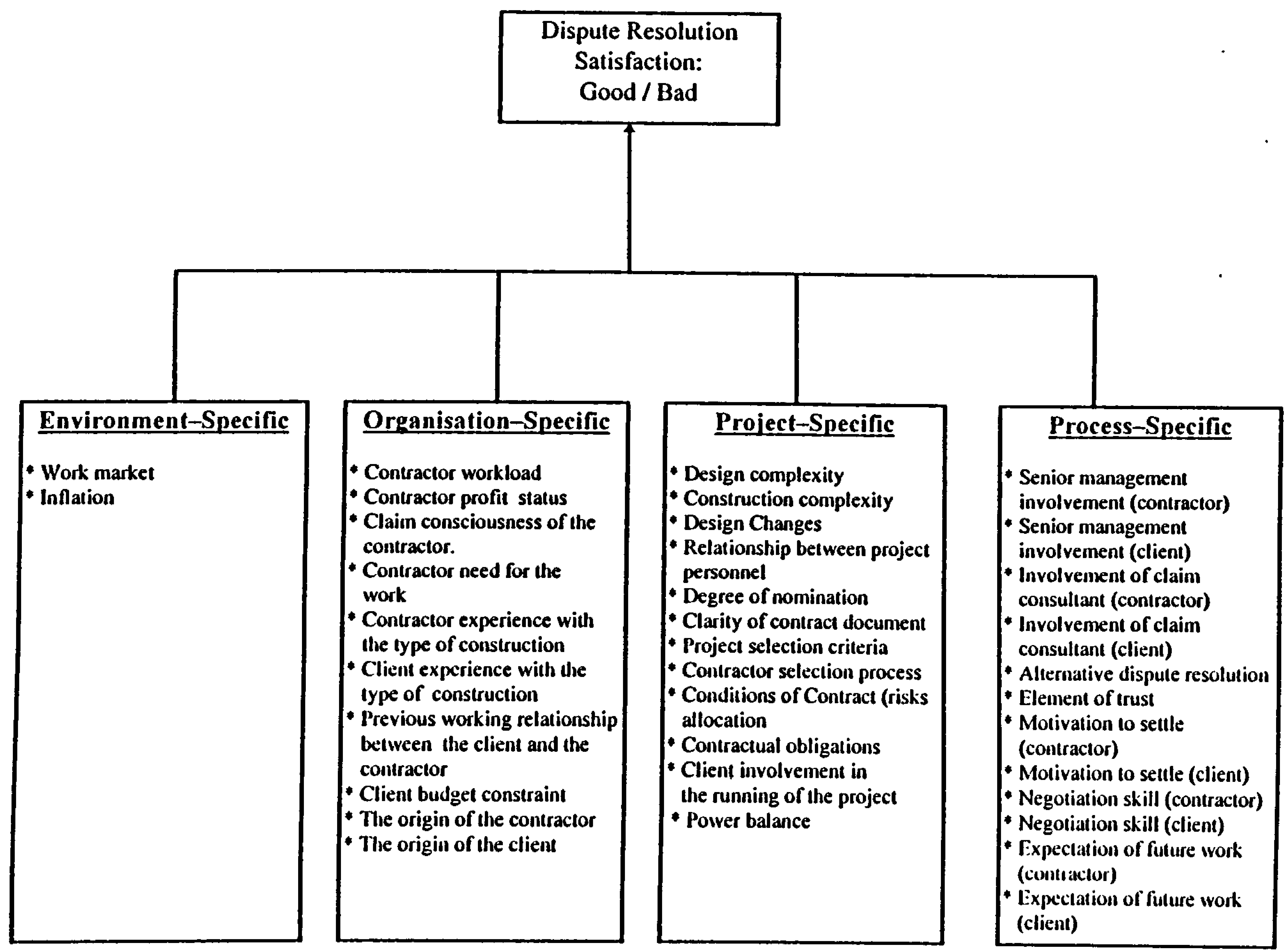


Fig. 4.1: Conceptual Framework for the Variables

References	Environment-Specific	Organisation-Specific	Project-Specific	Process-Specific
1 Jahren & Dammeier (1990)	Work Market [7]	Contractor work load [4]	Design Complexity [5,7,9]	Senior management involvement (contractor)
2 Ibbs & Ashley (1987)	Inflation	Contractor profit status [3]	Construction Complexity [5,7,9]	Senior management involvement (client)
3 NPWC (1990)		Contractor claim consciousness [1]	Design Changes [1,2,3]	Involvement of claim consultants (contractor) [1]
4 Russell (1990)		Contractor need for the work [5]	Relationship between project personnel [3]	Involvement of claim consultants (client) [1]
5 Ahmad & Minkarah (1988)		Contractor experience with the type of construction [4,5,7]	Degree of nomination [3]	Alternative Dispute Resolution [1]
6 Russell & Jaselskis (1992a)		Client experience with the type of the construction	Clarity of contract documents [3,6,12]	Element of trust [17,18]
7 Kometa, Olomolaiye & Harris (1994, 1995, 1996)		Previous working relationship between the client and the contractor [5,6,7]	Project selection criteria [6,7]	Motivation to settle (contractor) [19]
8 Brownlie & Harris (1987)		Client budget constraint [3]	Contractor selection process	Motivation to settle (client) [19]
9 Baccarini (1996)		The origin of the contractor organisation [20, 21]	Conditions of contract (risk allocation) [2,10,11]	Negotiation skill (contractor) [19]
10 Currie & Dorris (1986)		The origin of the client organisation [20,21]	Contractual obligations [7,19]	Negotiation skill (client) [19]
11 Thompson & Perry (1992)			Direct client involvement in the running of the project [6,7,13,14,15]	Expectation of future work (contractor) [19]
12 Bushait & Almohamis (1994)			Power balance [19]	Expectation of future work (client) [19]
13 Bresnen & Haslam (1991)				
14 Dunnam (1984)				
15 Wheeler (1987)				
16 Thompson (1991)				
17 Munns (1995)				
18 Munns (1996)				
19 Dickmann & Girard (1996)				
20 Tam (1993)				
21 Tam & Harris (1996)				

Table 4.3: Variables and Associated References

With regard to the third purpose, the sustainability is tested by identifying:

i) Any ambiguities that need to be clarified.

ii) Any potential difficulties that respondents may found.

iii) Data that cannot possible be obtained for one reason or another.

In order to achieve the above objectives, four in-depth interviews were conducted with a combination of practitioners in senior positions. These included:

* A claim consultant;
* A commercial Manager (Contracting Organisation);
* A contract administration manager (Client Organisation);
* A contract engineer (Client Organisation-Building Services Works).

4.4.2 Summary of the Pilot Study

During the interviews, the participants were asked to respond to the following questions:

(i) What is the general attitude of clients towards resolving construction disputes?

There is a general consensus view that construction clients expect that any problem arising during construction should be resolved through negotiation. It can generally be concluded that client would not like to see a dispute escalated to any formal resolution process. However, this does not mean that the clients will refrain from it. If arbitration is necessary, clients will go ahead with it, this is particularly so for clients of substantial financial resources. Furthermore, good contract administration practice will definitely reduce the chance of arbitration. A commercial approach to the resolution of disputes was advocated by all the participants of the pilot study. Hence, if a dispute is escalated to arbitration, it is beyond the client's expectation and clients will be dissatisfied.

(ii) Given a dispute situation, what factors would affect its resolution?

The variables listed in the questionnaire were considered comprehensive. Moreover, nearly all participants stressed the importance of maintaining relationships and a level of trust among project participants. One participant highlighted that dispute-specific variables may also be important factors affecting resolution, particularly so for public clients. The 'touch base' attitude of government organisations may lead to the use of the full range of dispute resolution procedures incorporated in the contract.

(iii) What factors would prompt a dispute to be escalated to the formal dispute resolution process (e.g. arbitration)?

It was raised by one participant that dispute-specific details should also be addressed. Nevertheless, as the tool so developed is intended to be used by the client as a forewarning device, dispute-specific factors will not be available and hence not included in this questionnaire. Above all, it is the commercial aspect that is the driving force behind all disputes, either to settle or to escalate to arbitration. The escalation in a dispute situation depends very much on the relationship between the site project personnel, particularly the personality of the people involved in the dispute resolution process. As the resolution process involves the interaction between the two parties in dispute, the degree of trust and credibility among them is of vital importance, yet it requires time to develop. Perceptions of the opposite party play a significant role, positive or negative, depending on the circumstances.

The active involvement of the senior management of both parties to a dispute usually shortens the resolution process. Nevertheless, there were also cases that some clients deliberately protracted the resolution process with the aim of deterring the contractor from continual pursuance due to the inhibitive cost.

A trial run of filling the questionnaire (Appendix A) was also conducted with each participant. The feed-back is summarised as follows:

Except for the claim consultant who may be able to provide information on both the client and the contractor, it was raised by the participants that it would be difficult to obtain project data simultaneously from both the client and the contractor of the same project, as either party is worried that the information they disclosed would become known to the other party. It is advisable that the project data required under the questionnaire can be solely obtained from the client. This is perfectly legitimate as the proposed tool is to be used by clients to predict the dispute resolution satisfaction prior to the commencement of a project. The sort of data available would then be limited to those available from the client's organisation internally and those obtainable from the pre-qualification processes.

Concerning the variables, the variables listed were considered by the participants as being comprehensive. In relation to specific questions, there were a few questions that the participants found vague and difficult to understand. In this context, a brief definition of a few terms was given or the question reworded. The interview reports for the pilot study are given in Appendix B.

Adopting the comments, a revised questionnaire with an explanation specification was revised and presented in Appendix C.

4.5 The Questionnaire used for Data Collection

The pilot study provided valuable feedback on both the design and the content of the questionnaire for data collection. The questionnaire was redrafted and contained four sections. On the front page, the purpose of the data collection was introduced and followed by a brief description of the format and contents of the questionnaire. To ensure that the projects did not have further significant disputes that would affect the interpretation of DRS, the projects had to have been completed with no outstanding unsettled disputes. This condition did not apply if arbitration proceedings had been held or were in progress.

As suggested from the pilot study, there were three terms used that needed explanation. These are disputes, dispute resolution satisfaction and alternative dispute resolution processes. Accordingly, these three terms were defined on the front page so that the respondents could understand these terms before proceeding to answer the questions.

Section one dealt with project background data including project title and parties to the contract. The project duration was also to be recorded as it would allow references to some economic indicators such as the work market, interest rate, inflation rate and trend of tender price indices. Data on the type of project, the role of the contractor and contract value would provide future cross–checking on the complexity of the project. Information about the conditions of contract used and the payment method were also requested. With regard to dispute resolution, the respondents were asked to indicate how the largest dispute was resolved and also give a general comment on the clients dispute resolution satisfaction in a categorical form; satisfied or not satisfied.

Section two deals with organisation–specific data. These typically consider the characteristics of the two parties to a dispute. Factors that may cause disputes and/or affect the parties' attitude towards resolving dispute were requested. For the client, experience with the type of construction was to be assessed by the number of similar projects run in the last three years. The client's budget constraint was to be determined by the ratio of estimate to tender sum.

The origins of the two organisations were also to be noted in order to detect any regional/cultural differences. The previous working relationship between the two organisations in the last three years was also to be recorded.

As for the contractor, the experience of the contractor with the type of project is to be assessed with the same criteria as for the client. The contractor's claim consciousness was to be assessed by looking at the relationship between the number of variation instructions, the number of claim notifications and the number of actual submissions.

Section three solicited data specific to the project. Four heads of data were to be collected; selection, nature, change and management. Firstly, the arrangement for tender and client's selection criteria needed to be understood. Secondly, the design and construction complexity of the project was to be assessed. The degree of nomination was assessed by the ratio of total Final Account of Nominated Subcontracts / Final Account figure.

The clarity of the extent of work, risk allocation and relationship between project personnel were assessed by a subjective Likert scale of 1 to 6. The degree of design changes was to be considered in terms of the ratio of the total of the variation bill and claims to the final contract sum. The client's involvement in the running of the project is reflected by the regularity of attendance to meetings.

Section four specifically dealt with the resolution process and consisted of 12 questions. Categorically, there were four heads of data requested; the resolution process, the people involved, the motivation to settle and the resolution environment. The data so sought are mainly perceptive and involve subjective assessments. A Likert Scale of 1 to 6 was used for this purpose.

One of the experts involved in the pilot study was asked to give comment on the redrafted questionnaire and the feedback was positive. The detailed measurement methods for the variables are given in Chapter Five.

CHAPTER FIVE
PRELIMINARY ANALYSES

5.1 Introduction

Resolving construction disputes is a complex process and the outcome depends on many factors. The potential factors were identified in Chapter Four. The factors are generically categorised into four groups; environment, organisation, project and process–specific variables. This chapter details the measurement of the variables. Checking the suitability of the data for MDA analysis is described herein. Preliminary analyses were conducted to test whether a reasonable discriminant function could be derived without utilising all four types of variables. Observations from the preliminary analyses provided the basis for the selection of variables for model development.

5.2 Measurement of Variables

As metric data are necessary for the application of discriminant analysis, in this context, the following approaches were generally adopted in determining the measurement of variables:

i. Wherever possible, factual data to be used;

ii. Where the variables cannot be measured by factual data, a Likert Scale of 1 to 6 will be used.

Based on these criteria, the measurements of the variables are discussed as follows. The value labels for the variables used in the analysis are given in brackets:

5.2.1 Environment–Specific Variables

Environment Specific Variables include those factors external to the project but which may have a bearing on the operation of the project. Inflation, interest rates and the general construction work market fall into this category. Sources of these data mainly came from the Census and Statistics Department and the Architectural Services Department of the Hong Kong Government. Summary of the data base for the same is given in Appendix D. The data set include:

- Consumer Price Index;
- Tender Price Index;
- Best Lending Rate;
- Consent to commence work;
- Gross value of Construction Works .

5.2.1.1 *Inflation* (E_INFL)

This was measured by the average change in Consumer Price Index (CPI) during the contract period. CPI reflects the impact of price increases on consumers and is commonly used as a measure of inflation affecting households in general.

$E\_INFL = (CPI_b - CPI_a) / n$

where,

CPI_b = CPI of the month when the project was completed

CPI_a = CPI of the month when the project was commenced

n = The project duration in months

5.2.1.2 *Tender Price Index* (E_TENIN)

The Tender Price Index (TPI) reflects the trend in tender prices submitted by contractors for government projects. The rise and fall of the TPI reflects the movement of tender price. A rising index indicates an increasing trend of tender price. This may just be a reflection of inflation. However, if a rapid increase in TPI is experienced in a short period of time, and there is no corresponding rapid increase in the inflation rate, then it may be that there is plenty of work available and the increase in tender price reflects the increase in the tender margin.

$E\_TENIN = (TPI_b - TPI_a) / n$

where,

TPI_b = TPI of the month when the project was completed

TPI_a = TPI of the month when the project was commenced

n = The project duration in months

5.2.1.3 *Interest Rate* (E_INTR)

Finance for the projects, both developmental and constructional, comes from banks and financial institutions. The cost of borrowing for the project is therefore measured by the best lending rate offered by the banks. The average cost of borrowing for the project is calculated by the following formula:

$E\_INTR = \Sigma\, INT / n$

where INT= Average Best Lending rate for the months during the project

5.2.1.4 *Work Available in the Market 1* (E_WKLD1)

In Hong Kong, all development plans and proposals have to be approved by the Building Authority. The Government provides monthly statistics on the Gross Floor Area (GFA) in m^2 of building work for which the Building Authority had given consent to commence work. In this context, the first measurement of work available in the market is given by:

E_WKLD1 = Σ Monthly GFA with consent to commence work / n

where,

n = the project duration in months

5.2.1.5 *Work Available in the Market 2* (E_WKLD2)

Another measure of the work market is given by the monthly statistics on the value of construction work carried out by contractors.

E_WKLD2 = ΣMonthly Value of Construction work carried out by Contractors / n

where,

n = The project duration in months

5.2.2 Organisation–Specific Variables

Organisation–specific variables are variables that characterise the client and the contractor organisation.

5.2.2.1 *Experience of the Client* (O_CLEXP)

The client's experience with the type of construction is measured by the number of similar projects developed in the last three years.

5.2.2.2 *Budget Constraint of the Client for the Project* (O-BUDGET)

Typically, this is a very sensitive piece of information that clients are reluctant to provide. In order to avoid such sensitivity, the respondents were asked to provide a ratio instead of factual figures:

0_BUDGET = Estimate for the project / Accepted Tender Figure

5.2.2.3 *Origin of the Organisations* (O_ORG_CL & O_ORG_CO)

It was considered that the attitude towards dispute resolution may be affected by the cultural background of the organisation. In this respect, the origin of the client and the contractor were recorded. The following annotations are used:

1	Japanese;	2	Korean;	3	Chinese
4	Hong Kong;	5	Western;	6	Others.

5.2.2.4 *Previous Working Relationship* (O_PRWKRE)

This was measured by the number of projects in the last three years that the two organisations have contracted.

5.2.2.5 *Experience of the Client with the type of Construction* (O_COEXP)

The number of projects of similar construction type that the contractor had in the last three years.

5.2.2.6 *Workload of the Contractor in the Local Market* (O_CAP_CO)

This is a variable that is difficult to measure. The use of asset value and contract value in hand was considered. However, it was pointed out by the participants in the pilot study that it would be difficult to obtain such information as even project managers may not have such information. Furthermore, construction companies in Hong Kong own little fixed asset. Very often, the only asset is the human resource, the level of which can be adjusted by normal hire and fire. In this context, the respondents were asked to give an assessment of the percentage of the contractor's capacity that was in operation during the project duration.

5.2.2.7 *Claim Consciousness of the Contractor* (O_C_CLAM)

The general attitude of the contractor towards claim was measured by comparing the number of claim notifications with the number of variation instructions.

O_CLAM = Number of Claim Notifications / Number of Variation Instructions

5.2.3 Project–Specific Variables

Project–specific variables refer to those variables that characterise the project. These cover the selection of the contractor, the complexity of the project, the relationship of the project personnel and client's involvement.

5.2.3.1 *Selection Criteria of Contractor* (P_SELCRI)

This was measured on a scale of 1 to 6, where 1 signifies choice solely by way of technical consideration and 6 implies selection based on price only.

5.2.3.2 *Tendering Process* (P_TENPRO)

This categorical variable recorded the tendering process through which the bidding for the project was conducted. Open tender is the most commonly used tender process in Hong Kong, although this is an increasing trend in the use of pre-qualification and negotiated tendering. The following annotations are used:

1	Open Tender;	2	Invited Tender;
3	Pre-qualification;	3	Negotiated (without other tenderers);
5	Others.		

5.2.3.3 *Design Complexity of the Project* (P_DESCOM)

A Likert Scale of 1 to 6 representing low to high was used to measure the design complexity of the project.

5.2.3.4 *Construction Complexity of the Project* (P_CONCOM)

Similar to 5.2.3.3, a Likert Scale of 1 to 6, representing low to high was used.

5.2.3.5 *Degree of Nomination* (P_NOMIN)

Many disputes between the contractor and client involve nominated subcontractors who may not be properly represented in the dispute resolution process. The degree of nomination of the project may have an effect on dispute exposure and is measured by the ratio:

Total of all Nominated Subcontracts Final Account / Project Final Account

5.2.3.6 *Work Scope Definition* (P_WKSCOP)

Disputes and claims over the extent and definition of the scope of work is common. P_WKSCOP records how well and clear the work scope of the project is defined by the contract documents. A Likert Scale to 1 to 6 (Yes-No) was the measurement.

5.2.3.7 *Risk Allocation* (P_RISKAL)

Similar to 5.2.3.6, P_RISKAL was measured on a scale of 1 to 6 (Yes - No), in the assessment of the respondents, regarding whether the risk allocation of the project was fair and equitable.

5.2.3.8 *Design Changes* (P_DESCH)

That design changes are the root of most claims and disputes is almost undisputed. The degree of design change of the project was measured by the ratio:

(Total of the Variation Bill + Claims) / Final Account Figure

5.2.3.9 *Relationship between Project Personnel* (P_REL)

The relationship between the project personnel is crucial and affects the construction operation. The respondents were asked to record their assessment on a Likert Scale of 1 to 6 (Good - Bad).

5.2.3.10 *Involvement of the Client in the Running of the Project* (P_INV_CL)

It is considered that client involvement in the running of the project is essential and instrumental to the timely resolution of bottlenecks. The degree of involvement is to be recorded by referencing to the mode of involvement of the clients, ranging from no involvement to full participation of having in-house design and contract administration teams.

5.2.4 Process–Specific Variables

The process of resolving disputes is undoubtedly critical to the resolution outcome. Although most dispute resolution clauses in construction contracts give the framework and procedural details that govern the resolution process. The prospect of resolution nevertheless hinges on the resolution team; their position, attitude and interest. These variables were measured on a Likert Scale of 1 to 6. The following Table 5.1 summarises the value labels and the measurements made.

5.3 Examination of Data prior to Analysis

There are certain data characteristics that need to be met in order to ensure the result of a discriminant analysis is reliable. An examination of the data is therefore prerequisite to a reliable analysis.

5.3.1 Checking for Multicollinearity

Multicollinearity affects the performance of discriminant analysis. Hence the first step in dealing with the data set is to check for multicollinearity. Multicollinearity denotes that two or more independent variables are highly correlated, so that one

Value Label	Variables	Likert Scale 1 2 3 4 5 6
R_ADR	The use of ADR to resolve contractual disputes	(Good - Bad)
R_NEG_CL	Negotiation Skill of the Client's team	(Good - Bad)
R_NEG_CO	Negotiation Skill of the Contractor's team	(Good - Bad)
R_MAN_CL	Senior Management Involvement of the Client	(High - Low)
R_MAN_CO	Senior Management Involvement of the Contractor	(High - Low)
R_ADV_CL	Involvement of External Claim Advisor in the Client Team	(Low -High)
R_ADV_CO	Involvement of External Claim Advisor in the Contractor team	(Low - High)
R_INC_CL	Incentive for Client to settle	(High - Low)
R_INC_CO	Incentive for Contractor to settle	(High - Low)
R_FUT_CO	Success of resolving dispute affecting possibility of future work requiring the contractor's expertise	(High - Low)
R_FUT_CL	Success of resolving dispute affecting possibility of future work form the same client	(High - Low)
R_TRUST	The level of trust between the two resolution teams	(Good - Bad)
R_EQUAB	Both parties have equal abilities and resources to absorb costs associated with a protracted resolution process	(Yes - No)

Table 5.1: Process–Specific Variables and their Measurements

variable can be highly explained or predicted by the other variable and thus adds little to the explanatory power of the entire set. Appendix E presents the correlation matrix for the variables. It was found that the following pairs of variables had correlation coefficients greater than 0.5 (Table 5.2).

Pair of Variables	Correlation Coefficient	Variable to be omitted
E_WKLD1 & E_TENIN	-0.5349	E_WKLD1
E_WKLD2 & E_TENIN	0.6851	E_WKLD2
E_WKLD1 & E_WKLD2	-0.5148	E_WKLD1 & E_WKLD2
P_DESCH & E_WKLD1	0.6321	E_WKLD1
P_RISKAL & O_ORG_CL	0.6538	O_ORG_CL
P_DESCOM & P_CONCOM	0.7680	P_CONCOM
P_WKSCOP & P_REL	0.5357	P_WKSCOP
R_ADR & O_ORG_CL	0.5430	O_ORG_CL
P_RISKAL & R_ADR	-0.5770	P_RISKAL
R_TRUST & P_REL	0.5588	R_TRUST
R_NEG_CO & P_REL	0.5223	R_NEG_CO

Table 5.2: Pairs of Variables with Correlation Coefficients greater than 0.5

From the first three pairs of Table 5.2 , it can be seen that E_TENIN can be used to represent E_EKLD1 and E_WKLD2. Therefore, the two workload variables were not be included for analysis.

Since E_WKLD1 was not to be included, P_DESCH was retained in the 4th pair. For the 5th pair, the categorical variable O_ORG_CL was dropped instead of the variable of risk allocation. For the 6th pair, it was believed that construction complexity is dictated somewhat by the design complexity. In addition, as the design of the project is governed by the client, in this respect, it is prudent to include P_DESCOM rather than P_CONCOM. Reading the 7th, 10th and 11th pairs together, P_REL was retained as it achieved the desired parsimony. Similarly, considering the 8th and 9th pair together, R_ADR was retained.

5.3.2 Categorical Variables

Although discriminant analysis can accommodate a small number of categorical variables, categorical variables basically do not meet the metric data requirement for MDA analysis, In this context, the following categorical variables were omitted from the analysis:

O_ORG_CL : The origin of the client

O_ORG_CO : The origin of the contractor

P_TENPRO : Tender Process

In addition, the origins of the organisations were dropped due to multicollinearity as discussed in Section 5.3.1.

5.4 Variables for Preliminary Analyses

After dropping variables due to multicollinearity or the variable being categorical, 26 numbers of variable were left for use in the Preliminary analysis detailed in Section Four. Table 5.3 gives a summary:

Environment–Specific	Organisation–Specific	Project–Specific	Process–Specific
E_INFL E_INTRA E_TENIN	O_BUDGET O_C_CLAM O_CAP_CO O_CLEXP O_COEXP O_PRWKRE	P_DESCH P_DESCOM P_INV_CL P_NOMIN P_REL P_SELCRI	R_ADR R_ADV_CL R_ADV_CO R_EQUAB R_FUT_CL R_FUT_CO R_INC_CL R_INC_CO R_MAN_CL R_MAN_CO R_NEG_CL

Table 5.3: Variables for Use in Preliminary Analyses

5.5 Preliminary Analyses

5.5.1 Introduction

In Section 5.4, 26 variables were identified for use in the Preliminary Analyses. However, the number of project data sets the model development sample was 48, a figure comparatively low in relation to the number of variables. In this context, preliminary analyses were conducted to test whether a reasonable discriminant function could be derived without utilising all four types of variables. In order to achieve this task, discriminant analyses were conducted with the following combinations of variable types:

i. Using one type of variable at a time;

ii. Using two types of variable at a time;

iii. Using three types of variable at a time;

iv. Using all four types of variable.

Tables 5.4 to 5.7 show a summary of the statistics of the discriminant functions so derived.

5.5.2 Analyses Using One Type of Variable

Variables	Fcn Eigenvalue	Canonical Corr	After Fcn Wilks' Lambda	After Fcn Chi-square
Env.	0.2090	0.4158	0.821732	8.636
Org.	0.1538	0.3651	0.866723	6.437
Project	0.3714	0.5204	0.729187	14.057
Process	0.8794	0.6840	0.532088	27.762

Variables	Group O Hit Rate	Group 1 Hit Rate	Overall Hit Rate
Env.	84.8%	33.3%	68.75%
Org.	100%	6.7%	70.83%
Project	81.8%	46.7%	70.83%
Process	90.9%	73.3%	85.42%

Table 5.4: Analyses with One Type of Variable at a Time

As shown in Table 5.4, the functions so derived all had low Eigenvalues (less than 1) and Canonical Correlations (0.4158 to 0.6840). In terms of hit rate, except for the Process–specific variables, the overall hit rates were around 70%. These suggest that using one type of variable would not provide a good discriminant function that would separate Good and Bad Dispute Resolution Satisfaction projects.

A computer print-out of the analysis is presented in Appendix F. It can be seen that Process–Specific group provide the best discriminating variables if the variable type is considered in isolation.

5.5.3 Analyses Using Two Types of Variable at a Time

Table 5.5 gives the statistics of the functions derived and the corresponding computer print-out is given in Appendix G.

It can be observed that improvements in Function Eigenvalue and Canonical Correlation were obtained by pairing types of variable. Similar to the result in Section 5.5.2, analysis with the inclusion of Process–Specific variables in general resulted in better performance that for those pairs without Process–Specific variables.

5.5.4 Analyses Using Three Types of Variable at a Time

The use of three types of variable at a time resulted in great improvement in the functions derived and overall hit rates thus obtained were above 90%. Again the analyses that included Process–Specific variables gave statistically better functions.

Variables	Fcn Eigenvalue	Canonical Corr	After Fcn Wilks' Lambda	After Fcn Chi-square
Env. & Org	0.4209	0.5442	0.703794	15.361
Env. & Project	0.7798	0.6619	0.561862	25.078
Env. & Process	1.2821	0.7495	0.438190	35.067
Org. & Project	0.6364	0.6236	0.611093	21.178
Org. & Process	1.5814	0.7827	0.387394	39.829
Proj. & Process	1.3098	0.7530	0.432943	35.579

Variables	Group O Hit Rate	Group 1 Hit Rate	Overall Hit Rate
Env. & Org	84.8%	53.3%	75%
Env. & Project	90.9%	66.7%	83.33%
Env. & Process	90.9%	80%	87.5%
Org. & Project	90.9%	66.7%	83.33%
Org. & Process	97%	86.7%	93.75%
Proj. & Process	93.9%	86.7%	91.67%

Table 5.5: Analyses with Two Types of Variable at a Time

The next discriminating type of variable was not so apparent as to be detected from the tables, although both Project–Specific and Organisation–Specific variables contributed to discriminating power of the function. Table 5.6 gives the summary of statistics of the discriminant functions derived and the corresponding computer print-out is given in Appendix H.

Variables	Fcn Eigenvalue	Canonical Corr	After Fcn Wilks' Lambda	After Fcn Chi-square
Env., Org. & Project	0.9107	0.6904	0.523364	27.842
Env., Org. & Process	2.0608	0.8205	0.326710	46.425
Env., Proj. & Process	1.9083	0.8100	0.343839	44.305
Org., Proj. & Process	2.4704	0.8437	0.288150	49.771

Variables	Group O Hit Rate	Group 1 Hit Rate	Overall Hit Rate
Env., Org. & Project	90.9%	73.3%	85.42%
Env., Org. & Process	93.9%	100%	95.83%
Env., Proj. & Process	97%	93.3%	95.83%
Org., Proj. & Process	100%	86.7%	95.83%

Table 5.6: Analyses with Three Types of Variable at a Time

5.5.5 Analysis Using Four Types of Variable Together

The last set of preliminary analyses was performed with the inclusion of all four types of variables. Table 5.7 gives the statistics obtained and the computer print-out is presented in Appendix I.

Variables	Fcn Eigenvalue	Canonical Corr	After Fcn Wilks' Lambda	After Fcn Chi-square
Env., Org., Proj. & Process	3.2528	0.8746	0.235140	56.455

Variables	Group O Hit Rate	Group 1 Hit Rate	Overall Hit Rate
Env., Org., Proj. & Process	97%	100%	97.92%

Table 5.7: Analysis with Four Types of Variable Together

The function derived appears to be a good discriminant function with a high Eigenvalue and Canonical Correlation. The after function Wilks' Lambda was low. The hit rate obtained was 100% for group 1 (Bad DRS) and 97% for group 0 (Good DRS). The overall hit rate was 97.92%.

5.5.6 Observations from the Preliminary Analyses

There was no single type of variable that would derive a reasonable discriminant function that separated the two groups of project very well. Apparently, process–

specific variables were the most discriminating. The inclusion of additional types of variables progressively resulted in higher hit rates and a statistically better function. This suggests that dispute resolution satisfaction is dependent on more than one aspect of a project.

Attention is now turned to the examination of the discriminant function obtained with the use of four types of variable. The unstandardised canonical discriminant function coefficients were:

R_ADV_CL	0.3114861
R_FUT_CL	-0.2217820
R_FUT_CO	0.4029302
R_INC_CL	0.4883144
R_MAN_CL	0.5208574
P_DESCH	5.4320739
P_DESCOM	-0.4889101
P_REL	0.3727568
P_SELCRI	-0.2874857
O_C_CLAM	0.0938817
O_CLEXP	0.1102568
O_COEXP	-0.1825786
E_INTRAT	0.2956902
E_TENIN	-0.1460386
(Constant)	-5.1132789

There were 14 discriminant variables selected to derive the discriminant function that achieved an overall hit rate of 97.92%. The 14 variables were spread across the four categories of variables as identified in the conceptual framework.

When designing the questionnaire, the questions were structured so that an increase in the numeric value of the variables generally increased the discriminant score (except for the cases of client and contractor experience) which indicated a push towards Bad Dispute Resolution Satisfaction. In this respect, a positive coefficient accorded with the proposition. However, referring to the coefficients, three variables violated the above and created an interpretation problem. These three variables were R_FUT_CL, P_DESCOM and P_SELCRI.

For the two variables relating to the experience of the organisation, more experience would imply greater chance of DRS, and hence a negative coefficient was expected. This worked well for O_COEXP but the coefficient for O_CLEXP was positive.

It would appear from the aforesaid observations that re-examination of the data for the derivation of a discrimnant function was necessary. Further elimination of variables is then discussed in Section 5.6.

5.6 Selection of Variables for MDA Model Development

5.6.1 Screening Criteria

Establishment of screening criteria is necessary to further reduce the number of variables. Firstly, variables that contribute nothing but "noise" in a univariate sense (an univariate F value of less than 1.0) are recommended for exclusion prior to a discriminant analysis. Table 5.8 gives the univariate F-ratio of the 26 variables identified in Section 5.4.

Secondly, there were certain Process Specific variables which described the attitude and position of the contractor as assessed by the client (because the questionnaires were completed by the clients' organisation). This raises the question of reliability.

It was then decided to exclude these variables from the model development. These variables are: R_ADV_CO; R_FUT_CL; R_INC_CO; R_MAN_CO.

Thirdly, the variable P_NOMIN was also excluded from the model development because the model development sample consisted of 21% of civil engineering projects (10 out of 48) which basically did not use the nomination system. Therefore, the distribution of the P_NOMIN was not a normal one. This variable was thereby dropped from the model development. Information in relation to both the model development and hold-out sample are given in Chapter Six.

5.6.2 Variables for MDA Model Development

Applying the elimination criteria as outlined above, the variables for the model development are set out in Table 5.9.

Variable	F	Significance
E_INFL	0.3014	0.5857
E_INTRA	0.1418	0.7082
E_TENIN	9.6139	0.0033
O_BUDGET	0.0599	0.8077
O_C_CLAM	2.7529	0.1039
O_CAP_CO	0.0284	0.8670
O_CLEXP	0.0015	0.9690
O_COEXP	1.9885	0.1652
O_PRWKRE	4.0862	0.04191
P_DESCH	8.9520	0.0044
P_DESCOM	0.0000	1.0000
P_INV_CL	2.3986	0.1283
P_NOMIN	1.2613	0.2672
P_REL	5.3477	0.0253
P_SELCRI	1.0219	0.3173
R_ADR	2.5236	0.1190
R_ADV_CL	5.7227	0.0209
R_ADV_CO	15.8401	0.0002
R_EQUAB	0.0612	0.8057
R_FUT_CL	0.9681	0.3303
R_FUT_CO	7.6938	0.0080
R_INC_CL	11.5322	0.0014
R_INC_CO	6.3548	0.0152
R_MAN_CL	11.5410	0.0014
R_MAN_CO	1.2116	0.2768
R_NEG_CL	2.2963	0.1365

Table 5.8 : Univariate F-ratio of the Variables

Environment Specific	Organisation Specific	Project Specific	Process Specific
E_TENIN	O_C_CLAM	P_DESCH	R_ADR
	O_COEXP	P_INV_CL	R_ADV_CL
	O_PRWKRE	P_REL	R_INC_CL
		P_SELCRI	R_MAN_CL
			R_FUT_CO
			R_NEG_CL

Table 5.9: Selected Variables for MDA Model Development

CHAPTER SIX
DISCRIMINANT FUNCTION DERIVED FROM SELECTED VARIABLES

6.1 Introduction

In Chapter Five, fourteen variables were selected for model development. These variables are listed in Table 6.1:

Variable Type	Value Label used in MDA	Brief Description
Environment Specific	E_TENIN	Average change in tender price index during the construction period.
Organisation Specific	O_CLAM	The ratio of claim notification to the number of variation instructions.
	O_COEXP	The number of projects of similar construction type that the contractor had in the last three years.
	O_PRWKRE	The number of projects that the parties have contracted in the last three years.
Project Specific	P_DESCH	The ratio of the sum of variation bill and claim to the final account figure.
	P_INV_CL	The degree of involvement of the client in the running of the project.
	P_REL	The relationship between the project personnel.
	P_SELCRI	The degree of reliance on price considerations in the selection of contractor.
Process Specific	R_ADR	The use of ADR to resolve contractual disputes.
	R_ADV_CL	The use of an external claim advisor.
	R_FUT_CO	The possibility of using the same contractor in future projects.
	R_INC_CL	The incentive for client to settle.
	R_MAN_CL	The degree of involvement of senior management in the dispute resolution process.
	R_NEG_CL	The negotiation skill of the client's dispute resolution team.

Table 6.1: Descriptions of the 14 Selected Variables for MDA Modelling

6.2 Data Analysis

Out of the sixty-one project data sets collected, 48 project data sets were used for the derivation of the MDA model. Validation of the model was carried out by applying the discriminant function derived to the hold-out sample. The splitting of the data set into the two samples was carried out randomly. The following Tables:

6.2: Data Composition by Client Organisation type

6.3: Data Composition by Project Type

6.4: Data Composition by Contract Value

6.5: Data Composition by the Role of the Contractor

give the data composition for both the model development sample (for the derivation of the MDA function) and the hold-out sample (for the validation of the function).

Client Organisation type	Number of Responses	Model Development Sample		Hold-Out Sample	
		Good DRS	Bad DRS	Good DRS	Bad DRS
Government	28	12	8	5	3
Quasi-Government	2	2	-	-	-
Institution	4	2	2	-	-
Private Developer	27	17	5	4	1
Total	61	33	15	9	4

Table 6.2: Data Composition by Client Organisation Type

Project type	Number of Responses	Model Development Sample		Hold-Out Sample	
		Good DRS	Bad DRS	Good DRS	Bad DRS
Public Housing	2	1	1	-	-
Residential	15	10	3	-	2
Industrial	4	2	1	1	-
Commercial	19	11	3	3	2
Civil Engineering	13	3	7	3	-
Hospital	6	4	-	2	-
Recreational	1	1	-	-	-
Institutional	1	1	-	-	-
Total	61	33	15	9	4

Table 6.3: Data Composition by Project Type

Contract Value(HK$)	Number of Responses	Model Development Sample		Hold-Out Sample	
		Good DRS	Bad DRS	Good DRS	Bad DRS
<10 mill	2	1	-	-	1
10-50 mill	16	8	8	-	-
50-100 mill	6	2	3	1	-
100-200 mill	12	9	1	2	-
200-500 mill	17	10	2	3	2
>500 mill	8	3	1	3	1
Total	61	33	15	9	4

Table 6.4: Data Composition by Contract Value

Role of the Contractor	Number of Responses	Model Development Sample		Hold-Out Sample	
		Good DRS	Bad DRS	Good DRS	Bad DRS
General Contractor	52	30	12	9	1
Design and Build	9	3	3	-	3
Construction Manager	0	-	-	-	-
Build Operate Transfer	0	-	-	-	-
Total	61	33	15	9	4

Table 6.5: Data Composition by the Role of the Contractor

6.3 The Discriminant Model

6.3.1 The Discriminant Model Function

Discriminant analysis on the 48 project data was performed using the SPSS programme and the computer print-out for the analysis is given in Appendix J. The discriminant function derived includes eight discriminating variables. These eight discriminating variables and their associated unstandardised canonical discriminant function coefficients are listed hereunder:

E_TENIN -0.1672046

O_C_CLAM 0.1006615

P_DESCH	4.3815758
P_REL	0.2504613
R_ADR	0.1290774
R_ADV_CL	0.3210849
R_INC_CL	0.4091552
R_MAN_CL	0.1794842
(Constant)	-2.9962721

The associated statistics of the canonical discriminant function were:

Eigenvalue:	1.5683
Canonical Correlation:	.7814
Wilks' Lambda:	.389358
Chi-square:	39.617 df =8, Sig = .0000

6.3.2 Assessing the Overall Fit of the Model

Assessing the overall fit of model can be done by way of examining the hit rate and the associated statistics.

6.3.2.1 Hit Rate

The hit rate refers to the percentage of correct classification according to the discriminant function derived.

Group 0 (Good DRS) Hit Rate:	30 out of 33 (90.9%)
Group 1 (Bad DRS) Hit Rate:	14 out of 15 (93.3%)
Overall Hit rate	44 out of 48 (91.67%)

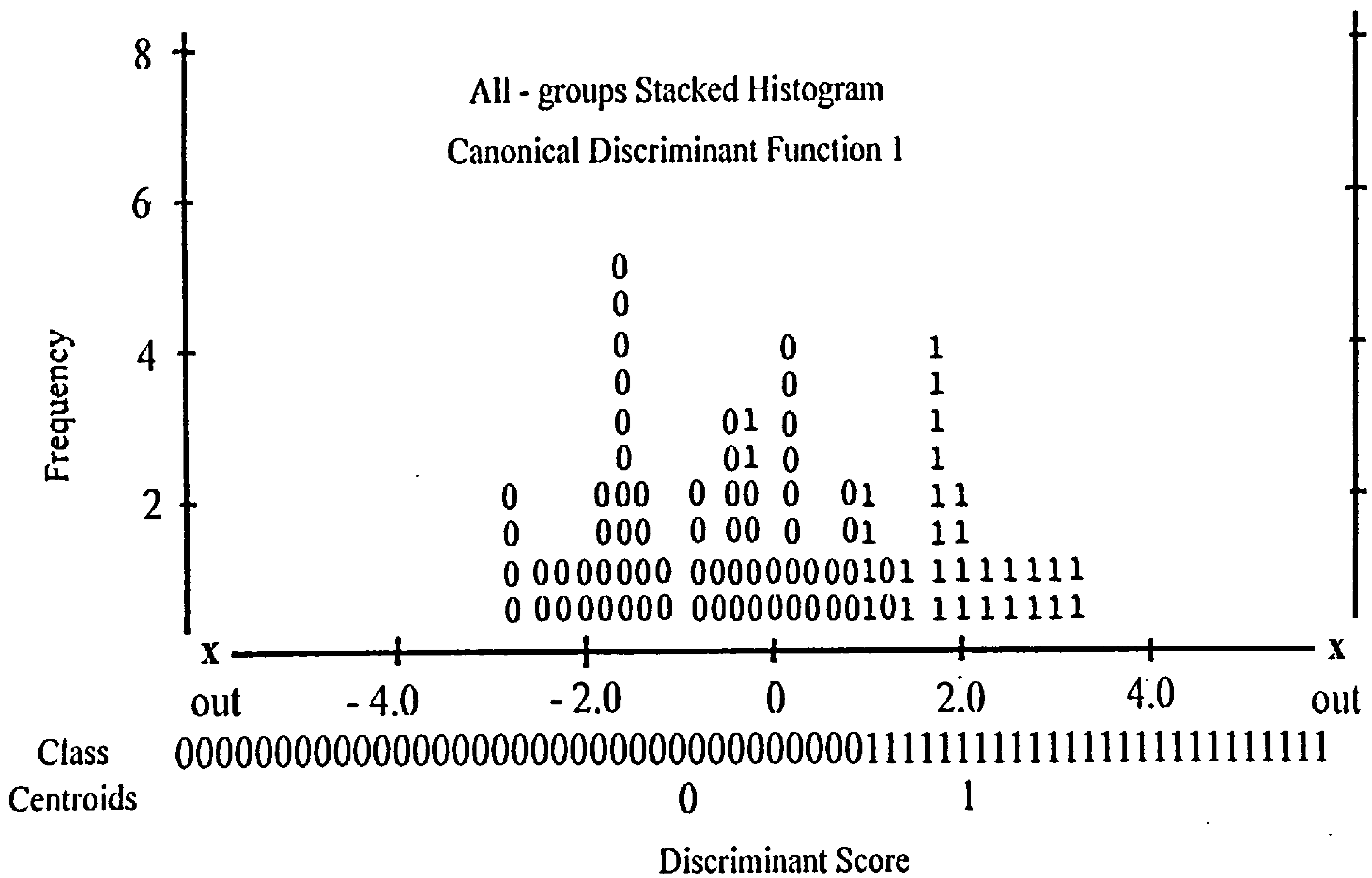


Fig. 6.1: All–Groups Stacked Histogram (0=Good DRS Project; 1=Bad DRS Project)

Diagrammatically, it can be represented as in Figure 6.1.

The groups' individual and the overall hit rates obtained were above 90% and considered to be reasonably good. Above all, these figures were much better than pure guess based on sample size.

Furthermore, the hit rate for Group 1 (Bad DRS, 93.3%) was higher than that for Group 0 (Good DRS, 90.9%). This suggests a better prediction for Bad DRS projects, a preferred scenario than the vice versa.

6.3.2.2 Eigenvalue

The coefficients of the discriminant function are chosen so that the ratio of the between groups sum of squares to the within groups sum of squares is as large as possible. One way to measure the variability is the use of the Eigenvalue which is the ratio of the between–groups to the within–groups sums of squares.

$$\text{Eigenvalue} = \frac{\text{Between–groups sum of squares}}{\text{Within–groups sum of squares}}$$

A good discriminant function should have a large Eigenvalue. The Eigenvalue of the discriminant function is 1.5683. Although a higher figure is desired, however, in view of the fact that dispute resolution is largely affected by human factors and is susceptible to emotions and subjectivity, an Eigenvalue of 1.5683 is therefore considered acceptable.

6.3.2.3 Canonical Correlation

In a two–group situation, the canonical correlation is simply the Pearson correlation coefficient between the discriminant score and the group variable. The Canonical Correlation measures the degree of association between the discriminant scores and the groups, it represents the total variance attributable to differences between the groups. The canonical correlation of the model function was 0.7814 indicating that almost 80% of the total variance was attributable to the differences between the two groups. Again, a higher figure is desirable, but for the same reason put forward to support the Eigenvalue obtained, 0.7814 is considered acceptable.

6.3.2.4 Wilks' Lambda

Wilks' lambda is the ratio of the within groups sum of squares to the total sum of squares. It is the proportion of the total variance in the discriminant scores not explained by differences among groups. The Wilks' lambda of the model function is 0.389358.

Small values of lambda are associated with functions that have much variability between groups and little variability within groups. A lambda of 1 occurs when the means of the discriminant scores are the same in all groups and there is no between– groups variability.

A test of the null hypothesis, that in the population from which the samples are drawn there is no difference between the group means, can be based on Wilks' lambda. Lambda is transformed to a variable that has approximately a chi-square distribution. A Wilks' lambda of 0.389358 was transformed to a chi-square value of 39.617 with eight degrees of freedom. The observed significance level was .0000. Thus it appears unlikely that projects with Good DRS and those of Bad DRS have the same means on the discriminant function.

In sum, the discriminant function derived is assessed as fit for classification purposes.

6.4 Calculation of the Cut-off Score and Validation of the Function

Two methods of calculating cut-off score are discussed in the following sections.

6.4.1 Troy's (1968) method.

The formula for the calculation of the cut-off score (Troy 1968) is:

$$Zc = -b \pm \sqrt{(b^2 - 4ac)} / 2a \qquad \text{(equation 6.1)}$$

Where Zc = The cut-off value between the two groups

$a = (1/4\sigma_0^2 - 1/4\sigma_1^2)$

$b = (\mu_1/2\sigma_1^2 - \mu_2/2\sigma_0^2)$

$c = (\mu_0^2/4\sigma_0^2 - \mu_1^2/4\sigma_1^2 - \log_{10} \sigma_1 + \log_{10} \sigma_0)$

and,

μ_0 = Mean of Group 0 sample (Good DRS);

μ_1 = Mean of Group 1 sample (Bad DRS);

$\sigma_0 = \sqrt{\{\Sigma(Z_0 - Z_{0Mean})^2 / (N-1)\}}$, Z_0 are Discriminant scores of group 0 ;

$\sigma_1 = \sqrt{\{\Sigma(Z_1 - Z_{1Mean})^2 / (N-1) \}}$, Z_1 are Discriminant Scores of Group 1 ;

Accordingly,

$\mu_1 = 1.81893$, $\sigma_1 = 0.74070$;

$\mu_0 = -0.82654$, $\sigma_0 = 1.99048$.

Applying these values to equation 6.1,

a = -0.3925

b = 1.7615

c = -1.03428

And Zc = 0.6947

To verify the validity of this cut-off score, this cut-off score of 0.6947 was used to classify the model development sample projects. The results are given in Table 6.6. It can be seen that the classification result is the same as that achieved using the SPSS programme.

Using 0.6947 as the cut-off score, the hit rate obtained with the Hold-out sample is

Group 0: 6 out of 9 correct (66.67%)

Group 1: 3 out of 4 correct (75.00%)

Overall: 9 out of 13 correct (69.23%)

The calculation of the discriminant scores and comparison with the cut-off score are given in Appendix K. Table 6.7 presents the classification results obtained for the Hold-out sample when the cut-off score of 0.6947 was applied.

6.4.2 Method of Kleinbaum, Kupper and Muller (1988)

Another approach in calculating the cut off score, as suggested by Kleinbaum et. al. (1988) takes into account the *priori* probabilities. In the approach, the cut-off score is calculated by the following equation:

$$Zc = \ln(p_0/p_1), \qquad \text{(equation 6.2)}$$

Project No	Actual Group	Discriminant Score	Classification by SPSS	Classification using Cut-off score (0.6947) calculated using Troy's (1968) method	Classification using cut-off score (0.7885) calculated using Kleinbaum, Kupper and Muller (1988) method	Project No	Actual Group	Discriminant Score	Classification by SPSS	Classification using Cut-off score (0 6947) calculated using Troy's (1968) method	Classification using cut-off score (0.7885) calculated using Kleinbaum, Kupper and Muller (1988) method
1	0	1.1059	1	1	1	25	0	-1.1671	0	0	0
2	0	0.6318	0	0	0	26	0	-0.1533	0	0	0
3	0	0.4227	0	0	0	27	0	-2.4296	0	0	0
4	0	0.1319	0	0	0	28	0	-0.4463	0	0	0
5	0	0.1317	0	0	0	29	0	-1.4380	0	0	0
6	0	0.1881	0	0	0	30	0	-0.0866	0	0	0
7	0	-1.7958	0	0	0	31	0	-0.08644	0	0	0
8	0	-1.5818	0	0	0	32	0	-0.6650	0	0	0
9	0	-0.3068	0	0	0	33	0	0.8203	1	1	1
10	0	-0.7837	0	0	0	34	1	0.9064	1	1	1
11	0	-1.9250	0	0	0	35	1	1.8762	1	1	1
12	0	-1.5990	0	0	0	36	1	2.2785	1	1	1
13	0	-2.1139	0	0	0	37	1	-0.1225	0	0	0
14	0	-1.8209	0	0	0	38	1	2.3107	1	1	1
15	0	-2.8104	0	0	0	39	1	1.8158	1	1	1
16	0	-1.5189	0	0	0	40	1	2.7198	1	1	1
17	0	-2.8132	0	0	0	41	1	1.9927	1	1	1
18	0	-0.2847	0	0	0	42	1	2.6414	1	1	1
19	0	0.1063	0	0	0	43	1	1.7204	1	1	1
20	0	-1.3353	0	0	0	44	1	1.9636	1	1	1
21	0	-1.6544	0	0	0	45	1	1.7183	1	1	1
22	0	-1.5941	0	0	0	46	1	1.4537	1	1	1
23	0	0.8410	1	1	1	47	1	1.0646	1	1	1
24	0	-0.4674	0	0	0	48	1	2.9363	1	1	1

Table 6 6: Classification Results Compared (Model Development Sample)

(Note: Projects Number 1,23,33 and 37 incorrectly classified) with p_o estimated by $n_0/(n_0+n_1)$ and

p_1 estimated by $n_1/(n_0+n_1)$,

then Zc=ln(p_0/p_1), estimated by ln(n_0/n_1).

Application to the model development sample (n_0=33 and n_1=15), gave

Zc= ln(33/15) = 0.7885.

Again when 0.7885 was used as the cut-off score, the classification result of the model development sample was the same as the classification performed by the SPSS programme.

With Zc=0.7885, the hit rate obtained with the hold-out sample is

Group 0:	7 out of 9 correct (77.77%)
Group 1:	3 out of 4 correct (75.00%)
Overall:	10 out of 13 correct (76.92%)

The calculation of the discriminant scores and comparison with the cut-off score are given in Appendix L. Again the classification results obtained for the hold-out sample when the cut-off score of 0.7885 was applied are presented in Table 6.7.

For the hold-out sample, it can be seen from Table 6.7 that the hit rate depends on the method of calculation of the cut-off score. The method that takes into account the *priori* probability gives a better hit rate. This is explainable, as the same method is used in the SPSS programme.

Project No.	Actual Group	Discriminant Score	Classification using Cut-off Score (0.6947) calculated by Troy's (1968) method	Classification using cut-off score (0.7885) calculated by Kleinbaum, Kupper and Muller (1988) method
49	0	-0.13354792	0	0
50	0	0.76181446	1	0
51	0	-0.43452974	0	0
52	0	-0.22271297	0	0
53	0	0.44780784	0	0
54	0	2.67505894	1	1
55	0	2.52755479	1	1
56	0	-0.49323061	0	0
57	0	-0.38545306	0	0
58	1	0.4775007	0	0
59	1	1.51176132	1	1
60	1	3.73336878	1	1
61	1	1.50157353	1	1

Table 6.7: Classification Results Compared (Hold-out Sample)

(Note: Incorrectly classified projects shaded)

6.5 Discriminating Variables

The interpretation of the discriminant function is by way of examining the standardised coefficients.

6.5.1 Examination of the Standardised Coefficients

In order to interpret the discriminant function, the coefficients are standardised. Standardised coefficients are obtained by multiplying the raw coefficient for each variable by the standard deviation of that variable. The standardised canonical discriminant function is given below and arranged in the order of magnitude of the coefficient (in absolute value):

E_TENIN	-0.60115
R_INC_CL	0.59561
O_C_CLAM	0.48236
R_ADV_CL	0.38400
P_REL	0.31197
P_DESCH	0.29049
R_MAN_CL	0.26735
R_ADR	0.24511

In essence, the higher the absolute value of the coefficient, the greater the contribution to the discriminant function.

The coefficient for tender price index was negative, which indicated that an increase in the E_TENIN value would reduce the discriminant score, i.e. towards Good DRS. A rising rate of change in the tender price index reflects an increasing trend in tender price. This may be due to inflation or there is plenty of work available in the market and that contractors can afford a higher margin of profit. It is believed that contractor's basic attitude is to get the project completed and to deploy their resources to other projects instead of lingering over unsettled disputes.

This attitude fits well with an increasing TPI as it suggests that finding more profitable ventures presents no difficulty in a rising market.

The second largest standardised coefficient relates to the incentive for the client to settle. It is measured by a Likert Scale of 1 - 6 (High to Low); an increase in this measurement will increase the discriminant score and push it towards a Bad DRS. Good DRS projects generally would have a low value for this variable measurement.

The third largest coefficient relates to the claim consciousness of the contractor. The higher the ratio of claim notifications to the number of variation instructions i.e. increase in the value of O_C_CLAM, the more anxious the contractor is to pursue contractual claims. It is further suggested that this mentality could also be inferred when the contractor's attitude towards dispute resolution is considered.

The use of a claims advisor has undergone a tremendous growth in the last two decades. However, instead of expediting the settlement, it would appear that the heavier the involvement of claim advisors, the more likely it is that the dispute will reach an impasse. The positive sign of the coefficient accords with this proposition.

Relationships are critical in any dealing between humans. Construction dispute resolution is a notable example. A high P_REL value suggests bad relation and pushes the project towards Bad DRS.

The degree of design change came sixth in terms of its contribution to the discriminating power of the function. A high degrees of design changes induces a greater chance of dispute. Hence the positive coefficient obtained confirms this view, a view widely accepted by the industry.

The last two variables relate to the resolution process; the relationship between the project personnel and the degree of involvement of the senior management, in terms of settlement prospects of a dispute, need little explanation. Senior management involvement is critical in dispute resolution as only they have the authority to make final decision. This has been discussed and reported in great volume. Nevertheless, the reality remains that senior management involvement is not forthcoming until the dispute has almost tied in a deadlock. In actual fact, disputes are often settled outside the court room with the last minute involvement of senior management

The last discriminating variable is most interesting. In recent years , there has been a great support to the use of ADR techniques in construction. Many standard forms of construction contract have now formally incorporated such use. The inclusion of R_ADR therefore supports the ADR movement.

The discriminant model function has offered substantial empirical support to the factors that affect dispute resolution as identified in the literature review. A thorough discussion of the discriminating factors, with the aid of a Principal Component Factor Analysis (PCFA) is given in Chapter Nine.

CHAPTER SEVEN
CLASSIFYING PROJECTS BY DISPUTE RESOLUTION SATISFACTION: AN ARTIFICIAL NEURAL NETWORK APPROACH

7.1 Introduction

Neural Networks are an expanding and interdisciplinary field bringing together mathematicians, physicists, neurobiologists, brain scientists, engineers, and computer scientists. Seldom has a field of study coalesced from so much individual expertise, bringing a tremendous momentum to neural network research and creating many challenges.

Neural network theory started with the first discoveries about brain cellular organisation. The challenge was immediately undertaken to discover the principles that would make a complex interconnection of relatively simple elements produce information processing at an intelligent level.

The theoretical neurobiologists' work also interested computer scientists and engineers. The principles of computation involved in the interconnection of simple elements led to cellular automata and work on cybernetics which laid the ground work for artificial intelligence. This branch is often referred to as artificial neural network.

7.2 Artificial Neural Networks (ANN)

Artificial neural networks (ANN) are highly distributed interconnections of adaptive, non-linear processing elements (PEs). When implemented in digital hardware, the PE is a simple sum of products followed by a non-linearity. An ANN is a collection of interconnected PEs (see Fig. 7.1). The connection strengths, also called the network weights, can be adapted such that the network's output matches a desired response.

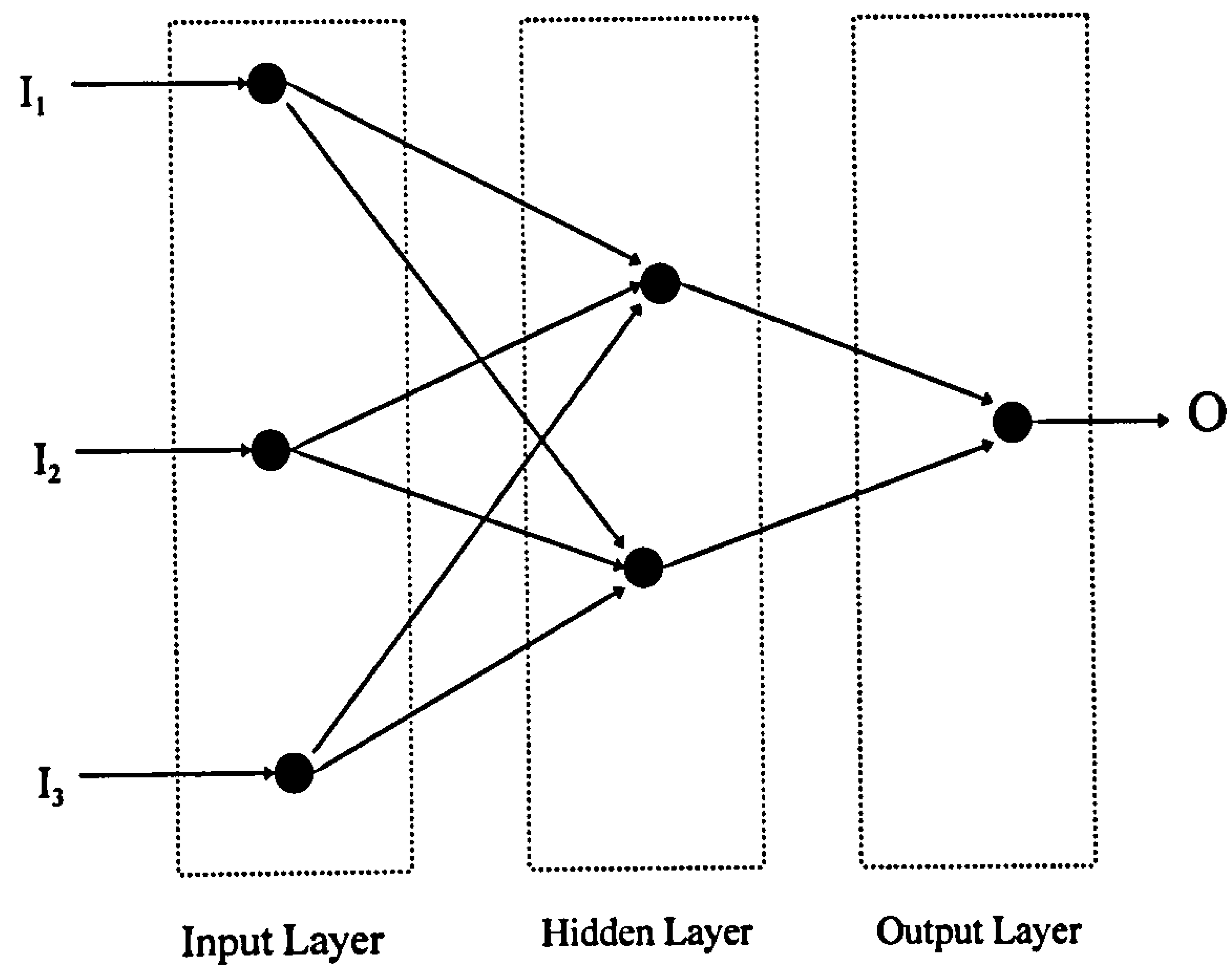


Fig. 7.1: A Typical Neural Network Architecture with One Hidden Layer

Neural networks function as an information processing technique which, being analogous to the effect of the synaptic strength in the biological neuron, each input is multiplied by a weight. The sum of all weighted inputs determines the degree of firing, called the activation level, that is further modified by an activation function to produce the output signal, expressed as

$O = f(\Sigma w_i x_i)$

Where O= output;

x_i and w_i = ith input and its corresponding weight; and

f = the activation function

Individually, the processing elements perform trivial functions, but collectively, in the form of a network, they are capable of solving a wide spectrum of complicated problems, ranging from interpretation, classification, modelling, prediction, to the tasks of estimation. In its general form, a neural network is configured from a number of processing elements that are organised into layers with full or partial connections between successive layers (see Fig. 7.1). Typically, there are two layers with connections to the outside world, namely, an input buffer where data is presented to the network, and an output buffer that holds the response of the network to the given input. The other layers are called hidden layers. The processing elements in these hidden layers provide the non-linearity relationships for the network.

7.3 Applications of Artificial Neural Networks in Construction

Neural networks attempt to model the brain's learning, thinking, storage, and retrieval of information, as well as associative recognition. This is particularly suitable for construction problems where judgement and experience are key requirements for the resolution of such problems (Mohan 1990). The support of such suggestion also hinges on the distinction between problems involving deduction from induction or analogy (Adeli 1988). With regard to construction problems, it was suggested that the ability of construction experts to produce reliable decisions in reality does not involve reasoning in order to come up with a decision, but rather uses these rules to try to explain why they arrived at those decisions (Gallant 1988). Furthermore, construction problems typically involve a large number of interrelated attributes that must be considered in parallel are very difficult to model using a deductive approach. It is contended that construction experts resolve construction problems using the analogy technique. The use of neural networks as management tools to resolve analogy-based decision problems has gained substantial support (Gallant 1988; Castelaz, Angus & Mohoney 1987) and in construction (Moselhi, Hegazy & Fazio 1991).

Several applications of neural networks to construction problems have been reported:

i) in optimal mark-up estimation (Moselhi, Hegazy & Fazio 1991);

ii) in predicting changes in the construction cost index (Williams 1994);

iii) in estimating construction technology acceptability (Chao & Skibniewski 1995);

iv) in predicting construction budget performance (Chua, Kog, Lok & Jaselskis 1997);

v) in estimating productivity given a set of weather parameters (AbouRizk & Wales 1997);

vi) in forecasting construction project completion (Al-Tabtakai, Kartam, Flood & Alex 1997);

vii) in predicting subcontractor ratings for construction firms (Albino & Garavelli 1998).

Mark-up estimation can be an art, an educated guess or pure speculation. Moselhi, Hagazy and Fazio (1991) reported the successful use of a neural network for the estimation of the optimal mark-up for construction projects.

Williams (1994) used an ANN to develop a model to predict changes in construction cost index with macroeconomic input data. The result obtained from the ANN model was compared with exponential smoothing and regression technique. It was found that these techniques are overall more accurate predictors than the ANN model. It was suggested that because the behaviour of the economy is cyclical and training set used consisted mainly of data reflecting a period of high inflation, it was therefore not applicable to the testing sample which representing a period of low inflation.

Chao and Skibniewski (1995) made use of an ANN model to estimate the potential acceptability of a piece of construction technology when compared with a base technology. The empirical relationships between the performance indicators of cost, risk, flexibility and manoeuvrability and technology acceptability were collected and used for the training of the network. The model so produced was satisfactorily tested with a testing sample.

The use of a neural network to predict budget performance through the study of management input factors was reported by Chua, Kog, Lok and Jaselskis (1997). With a selective choice of relevant factors such as budget updates, control systems etc., the network produces satisfactory prediction on unseen data. It was suggested that the model so derived could serve as a valuable tool for management in evaluating various strategies and thereby improving the resource deployment.

AbouRizk and Wales (1997) employed a combined model that includes the use of mathematical and statistical methods to model weather processes and trained neural networks to estimate the effects of weather on productivity.

The wide application of neural networks is also evidenced in the work of Albino and Garavelli (1998) on subcontractor evaluation. The subjective assessments of experts were used to provide training data. It was found that the network performs better prediction under stable conditions than other circumstances where subcontractors are needed for urgent work on the critical path of a project.

Another example of using expert judgement as training data can be found in the work of Al-Tabtabai, Kartam, Flood and Alex (1997). The trained network was used to forecast construction schedule variances i.e. departures from scheduled completion time.

In all of the above applications of neural networks, the researchers had a consensus view that because of the large number of factors affecting the final decisions, or for lack of any formal structure behind such decisions, the application of neural networks has offered the required breakthrough.

The decision pattern of construction disputants in determining whether to move up the dispute resolution ladder is probably as complex, if not more, than the problems presented in the previous neural network applications described above.

7.4 Dispute Resolution Satisfaction Classification Using Artificial Neural Networks

7.4.1 Classification using Artificial Neural Networks

A neural network is an adaptable system that can learn relationships through repeated presentation of data, and is capable of generalising to new, previously unseen data. Neural networks are used for both regression and classification. In regression, the outputs represent some desired, continuously–valued transformation of the input patterns. In classification, the objective is to assign the input patterns to one of several categories or classes, usually represented by outputs restricted to lie in the range from 0 to 1, so that they represent the probability of class membership. For classification, a Multi-layer Perceptron (MLP) network can learn the Bayesian posterior probability of correct classification. This means that the neural network takes account of the relative frequency of occurrence of the classes, giving more weight to frequently occurring classes.

7.4.2 The NeuroSolution Package

The neural network package used in this study was NeuroSolutions (NeuroDimension Inc.). The NeuroSolutions package offers a wide range of applications and, among those, pattern classification using Multi-layer Perceptron (MLP) was used in this investigation.

Some networks are supervised, in that a human determines what the network should learn from data. In such cases, the network is to be given a set of inputs and corresponding desired outputs, and the network tries to learn the input-output relationship by adapting its free parameters. Other networks are unsupervised, in that the way they organise information is hard-coded into their architecture.

Multi-layer Perceptron (MLP) is a type of artificial neural network of the feedforward type. MLP is one of the most widely implemented neural network topologies. Generally speaking, for static pattern classification, the MLP with two hidden layers is a universal pattern classifier. In other words, the discriminant functions can take any shape, as required by the input data clusters. Moreover, when weights are properly normalised and the output classes are normalised to 0/1, the MLP achieves the performance of the maximum a posterior receiver, which is optimal from a classification point of view. MLP has been applied to pattern classifiers in the areas of quality control, financial forecasting, target marketing, bankruptcy prediction, and optical character recognition.

The classification of projects according to their dispute resolution satisfaction as defined in this research project, fits nicely into the classification ability of the supervised learning neural network (Pattern Classifiers) of MLP:

Two important characteristics of MLP are its non-linear processing elements (PEs) which have a non-linearity that must be smooth; and their massive interconnectivity.

A MLP network is trained with error–correction learning, which means that the desired response for the system must be known. In pattern recognition this is normally the case, since the input data are labelled, i.e. we know which data belongs to which experiment.

The following steps are involved in using MLP as pattern classifiers:

1. Input/desired data file creation
2. Network analysis
3. Neural Topology
4. Simulation control
5. Simulation

7.4.3 The Use of MLP for Classification by Dispute Resolution Satisfaction (DRS)

The following summarises the steps in using MLP to classify projects according to Dispute Resolution Satisfaction. In this investigation, projects with the largest dispute resolved through negotiation between project personnel are defined as good DRS. On the other hand, if the largest dispute is resolved beyond site level, which includes either using a neutral third person or triggering the dispute settlement clause, then the project dispute resolution satisfaction is defined as bad.

7.4.3.1 Step One: Input/ Output Data File

The NeuroSolution with Excel provided a convenient tool for the generation of the Input/Output File. The data was arranged in a spreadsheet format with each row representing one project. Variables that were to be used in developing the network were marked as inputs.

The Dispute Resolution Satisfaction (DRS) is designated as Desired Output with a binary notation of 0 and 1. For example, if a project is defined as good DRS, then the data entry is Good DRS = 1, Bad DRS = 0. If the project DRS is Bad, then the data entry is Good DRS = 0, Bad DRS =1. The project data that are to be used for training and testing are also tagged in this step.

7.4.3.2 Step Two: Network Analysis

Neural networks can be over-trained to the point where performance on new data actually deteriorates. Roughly speaking, over-training results in a network that memorises the individual exemplar, rather than trends in the data set as a whole. Cross validation is a process whereby part of the training set is set aside for the purpose of monitoring the training process, to guard against over-training. Normally, cross-validation is an essential part of neural network training. However, if the training set is small to begin with, as in the current investigation, it may not be possible to split the data set.

7.4.3.3 Step Three: Neural Topology

The Multi-layer Perceptron network architecture permits users to specify the number of hidden layers, the number of Processing Elements (PE) and the transfer function. Unless the problem is particularly difficult, one hidden layer is usually enough for two–way classification problems. In the preliminary analyses, trial runs on 1 and 2 hidden layers are performed to examine the effect of increasing the number of hidden layers.

The number of PEs used directly affects the overall computing power of the network. Ideally, it should be chosen based on the complexity of the desired input-output mapping of data, but can practically be determined experimentally. It is important to note that the minimal number of PEs needed to solve a problem need not be related to the size of the data set. However, MLP does not know the complexity of the data, and thus chooses the number of PEs proportional to the number of input channels. This is likely to overestimate the required number of PEs, but at least the network is likely to learn on the first trial. However, good generalisation to new data depends on finding the minimal number of PEs that can solve the problem. In the preliminary analyses, the number of PEs to be used was selected by the package. A reduction in the number of PEs was carried out during refinement of the network.

As for the transfer function, several types of axons that provide a non-linearity are available from the network:

Axon	Output Range	Features
TanhAxon	-1 to 1	Non-linear axon of choice
SigmoidAxon	0 to 1	Same general shape as TanhAxon
Linear TanhAxon	-1 to 1	Piecewise linear approximation to TanhAxon
Linear SigmoidAxon	0 to 1	Piecewise linear approximation to SigmoidAxon

Of the four listed, only the TanhAxon and SigmoidAxon are commonly used on the hidden layers. For most problems, the TanhAxon transfer function is recommended for use. In this regard, TanhAxon was used for the input transfer function. It meant that each input data set was normalised to the range of -1 to 1 before feeding into the network. As for the output transfer function, since the DRS was notated by the binary figure of [1,0], a SigmoidAxon transfer function therefore is used for the output transfer function.

7.4.3.4 Step Four: Simulation Control

Simulation Control involves the selection of the way of training the network and when to stop. The nature of the current investigation falls into a supervised type of training. In supervised training, three parameters can be set:

i) The maximum number of Epochs to train;

ii) Termination criteria;

iii) Frequency of "Weight Update".

The maximum epoch is the maximum number of iterations that will be done if no other criterion kicks in. In the preliminary analyses, 1000 epochs were set as the maximum epochs.

The MLP had a Mean Square Error (MSE) termination activated by default. The terminating criteria used was the cessation of significant decrease in MSE.

The "Weight Update" option determines when the network weights are updated. Two options are available; "On-Line" and "Batch". "On-Line" learning updates the weights after the presentation of each exemplar, while "Batch" learning delays updates until the entire training set has been presented, and thus effectively averages the weight updates over the data set. It was recommended by the

NeuroSolution package that "Batch" weight update be used because the learning is stable over a wider range of step sizes.

7.4.3.5 Step Five: Simulation

Having performed the above four steps, NeuroSolution is then ready to build the network. The network so built was then trained by the training set as defined in step one. The weights so obtained were saved and applied to the training set (48 numbers, the same as for the model development sample in the MDA study), again to obtain classification results. Similarly, the saved weights were also applied to the testing set (13 numbers, the same as the hold-out sample of the MDA study) and classification results obtained.

7.5 Preliminary Analyses

7.5.1 Prediction Variables

The same 61 project data sets used in the Multivariate Discriminant Analysis (MDA) model development were used for this ANN modelling by MLP. Without repeating the measurements for these variables, the names and abbreviations of the variables are given in the following Table 7.1.

There were altogether, 36 variables at the start. In Multivariate Discriminant Analysis (MDA), the data to be used in the model development has to satisfy certain criteria such as normality and not be subject to multicollinearity. One of the advantages of an ANN is that its application is not restrained by such data requirements. Therefore it was intended to involve as much as possible of available data. Nevertheless, three categorical variables will not be used and these are:

O_ORG_CL;

O_ORG_CO; and

P_TENPRO.

For the two categorical variables of origin of the organisation, because the bulk of the sample projects was made up of Hong Kong based organisations (Contractor- 33 out of 48, Client- 38 out of 48), it was believed that these variables would offer little differentiating power. In addition, categorical variables are not used in the MDA model, for the sake of consistency, the categorical variable related to the tendering process was also dropped.

This left 33 variables for model building by Multi-layer Perceptron (MLP) of the NeuroSolution Package.

7.5.2 Training and Testing Results from the Preliminary Analyses

As in MDA, trial runs were conducted with the following combination of variables:

i) Analysis using one type of variable;

ii) Analysis using two types of variable;

iii) Analysis using three types of variable; and

iv) Analysis using four types of variable.

Applying the training and testing procedures as set out in Section 7.4, the corresponding training and testing results were obtained. Table 7.2 gives the results using one hidden layer and Table 7.3 gives the results using two hidden layers. The computer print-outs of the results are given in Appendices M and N respectively.

Environment–Specific	Organisation–Specific	Project–Specific	Process–Specific
Inflation (E_INFL)	Experience of the client (O_CLEXP)	Selection criteria (P_SELCRI)	Use of ADR (R_ADR)
Tender price index (E_TENIN)	Budget constraint of the client (O_BUDGET)	Design complexity (P_DESCOM)	Negotiating skill of the client (R_NEG_CL)
Interest rate (E_INTR)	Previous working relationship (O_PRWKRE)	Construction complexity (P_CONCOM)	Negotiating skill of the contractor (R_NEG_CO)
Work availability1 (E_WKLD1)	Experience of the contractor (O_COEXP)	Degree of nomination (P_NOMIN)	Involvement of senior management of the client (R_MAN_CL)
Work availability2 (E_WKLD2)	Workload of the contractor (O_CAP_CO)	Work scope definition (P_WKSCOP)	Involvement of senior management of the contractor (R_MAN_CO)
	Claim consciousness of the contractor (O_C_CLAM)	Risk allocation (P_RISKAL)	Involvement of claim advisor in the client team (R_ADV_CL)
		Design changes (P_DESCH)	Involvement of claim advisor in the contractor team (R_ADV_CO)
		Relationship (P_REL)	Client incentive to settle (R_INC_CL)
		Client involvement (P_INV_CL)	Contractor incentive to settle (R_INC_CO)
			Future use of contractor (R_FUT_CO)
			Future work from Client (R_FUT_CL)
			Level of Trust (R_TRUST)
			Ability to absorb costs (R_EQUAB)

Table 7.1: Variables for MLP Modelling: Names and Abbreviations

7.5.3 Observations from the Preliminary Analyses

i) No single type of variables sufficient.

Variables	No. of PEs	No. of Hidden Layers	MSE @ 1000 Epoch	Training Result		Testing Result	
				Good	Bad	Good	Bad
Env. (E)	10	1	0.0602	93.94%	66.67%	66.67%	0%
Org. (O)	12	1	0.0293	100%	93.33%	88.89%	0%
Proj. (P)	18	1	0.0011	100%	100%	88.89%	50%
Proc. (R)	21	1	999/0.011	100%	93.33%	66.67%	25%
E+O	20	1	0.0027	100%	100%	77.78%	0%
E+P	22	1	999/0.0004	100%	100%	88.89%	75%
E+R	24	1	999/0.0005	100%	100%	77.78%	50%
O+P	22	1	998/0.0003	100%	100%	100%	50%
O+R	24	1	998/0.0004	100%	100%	88.89%	25%
P+R	26	1	996/0.0002	100%	100%	88.89%	50%
E+O+P	25	1	997/0.0002	100%	100%	88.89%	50%
E+O+R	27	1	997/0.0002	100%	100%	88.89%	25%
E+P+R	28	1	993/0.0001	100%	100%	77.78%	50%
O+P+R	29	1	993/0.0001	100%	100%	88.89%	50%
E+O+P+R	31	1	992/0.0001	100%	100%	77.78%	25%

Table 7.2: Training and Testing Results using One Hidden Layer

It can be observed that in both situations where one or two hidden layers were used, no single type of variables provided reasonably good generalisations as evidenced by the low success percentage in classifying projects with Bad DRS in the testing sample. The same observation was obtained in the MDA analysis.

Variables	No. of PEs	No. of Hidden Layers	MSE @ 1000 Epoch	Training Result		Testing Result	
				Good	Bad	Good	Bad
Env. (E)	10/5	2	0.0609	93.94%	73.33%	66.67%	0%
Org. (O)	12/6	2	0.0311	100%	80%	88.89%	0%
Proj. (P)	18/9	2	0.0012	100%	100%	77.78%	75%
Proc. (R)	21/14	2	0.0011	100%	100%	66.67%	25%
E+O	20/13	2	0.0214	100%	86.67%	77.78%	0%
E+P	22/14	2	999/0.0007	100%	100%	77.78%	75%
E+R	24/16	2	0.0011	100%	100%	77.78%	50%
O+P	22/15	2	999/0.0006	100%	100%	100%	25%
O+R	24/16	2	0.0009	100%	100%	66.67%	75%
P+R	26/17	2	999/0.0007	100%	100%	88.89%	50%
E+O+P	25/16	2	998/0.0005	100%	100%	88.89%	75%
E+O+R	27/16	2	999/0.0006	100%	100%	88.89%	25%
E+P+R	28/19	2	998/0.0005	100%	100%	77.78%	50%
O+P+R	29/19	2	999/0.0005	100%	100%	88.89%	50%
E+O+P+R	31/21	2	997/0.0003	100%	100%	88.89%	50%

Table 7.3: Training and Testing Results using Two Hidden Layers

ii) Project specific variables offer the greatest discriminating power when examined singularly.

As evidenced in Tables 7.2 and 7.3, where Project Specific variables were involved, the testing results for Bad DRS projects were usually higher than for situations where Project–Specific variables were not involved. In MDA modelling, Process–Specific variables offered the highest discriminating power when compared with the other three types of variables.

iii) High Classification Accuracy for the Training Set.

The computational power of ANN was reflected in the almost 100% correct classification results obtained when the trained network was applied to the training set. In MDA modelling, by contrast when the discriminant functions were applied to the model development sample, the correct classification ranged around the 90% mark.

7.6 MLP Model Development using Selected Variables

The preliminary analyses conducted suggested that training results were generally good. However, the testing results, especially for projects of Bad DRS, were not satisfactory, This called for further analyses.

Further analyses were conducted with the following variable sets:

i) The selected variables (14 numbers) screened for the MDA model development. The steps taken to carry out the analysis are shown in Figure 7.2;

ii) The 8 discriminating variables identified in the discriminant function. The testing results will be compared with the MDA result.

Step One
Build & Train
Network

↓

Step Two
Initial Testing
Results

↓

Step Three
Optimising Network:
i) Minimising No. of PE; and
ii) Training Multiple Runs for Stability

↓

Step Four
Final Testing Results

↓

Step Five
Sensitivity About the Mean:
Identifying Sensitive Variables

Fig. 7.2: Steps in Further Analysis with 14 Selected Variables

7.6.1 A Network with 14 Selected Variables used in MDA Model Development

7.6.1.1 Step One and Step Two

A total of 14 variables were selected for MDA model development (Section 5.6.2 refers) and these were:

E_TENIN;

O_C_CLAM; O_COEXP; O_PRWKRE;

P_DESCH; P_INV_CL; P_REL; P_SELCRI;

R_ADR: R_ADV_CL; R_INC_CL; R_MAN_CL; R_FUT_CO;

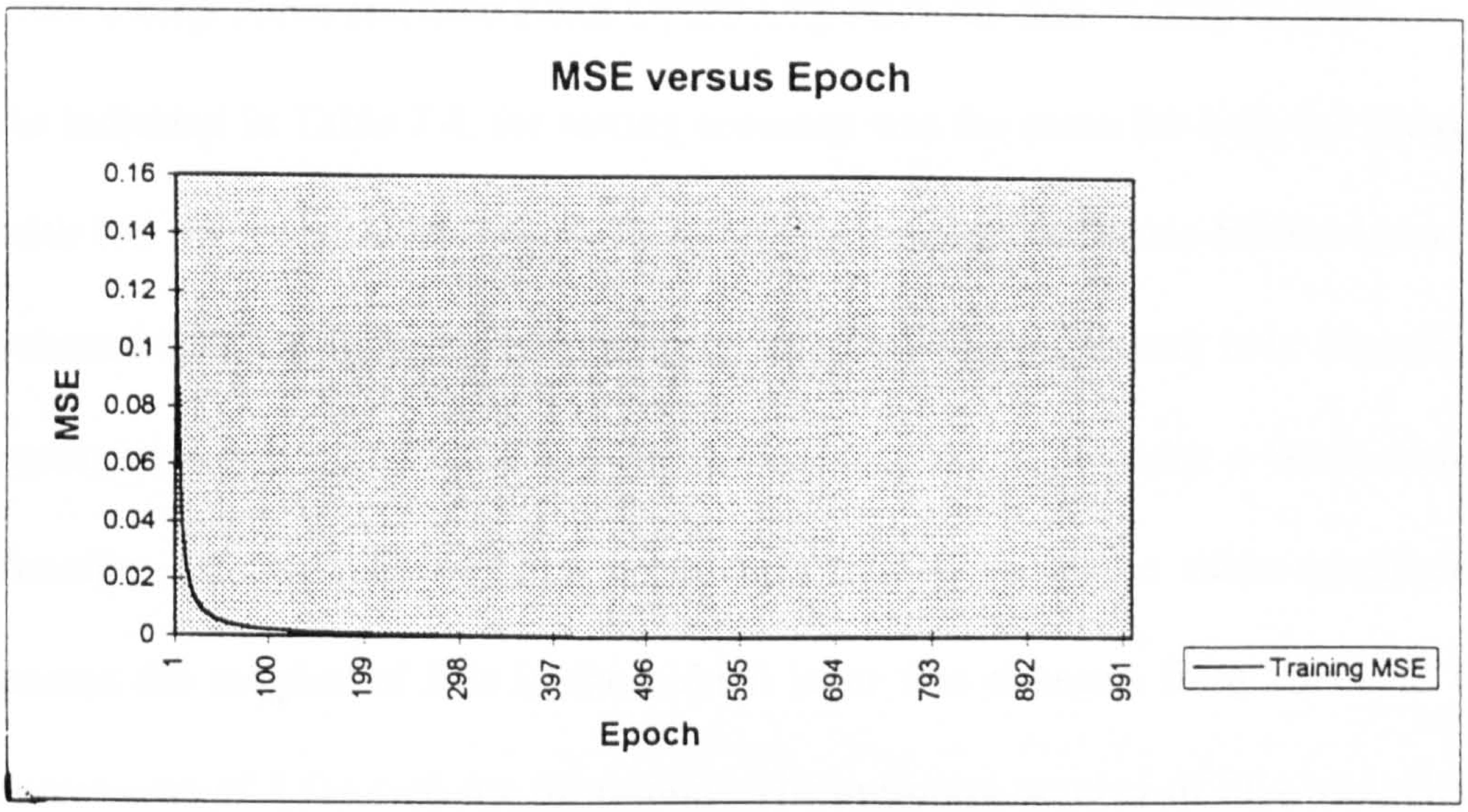
R_NEG_CL

The training and testing procedures as set out in Section 7.4.3 were applied and the training and testing results are summarised in Table 7.4. The computer print-outs for the simulations are given in Appendix O.

Variables	No. of PEs	No. of Hidden Layers	MSE @ 1000 Epoch	Training Result		Testing Result	
				Good	Bad	Good	Bad
Selected Variables (used for MDA model development)	22	1	995/ 0.0001	100%	100%	77.78%	100%
	22/14	2	998/ 0.0005	100%	100%	77.78%	100%

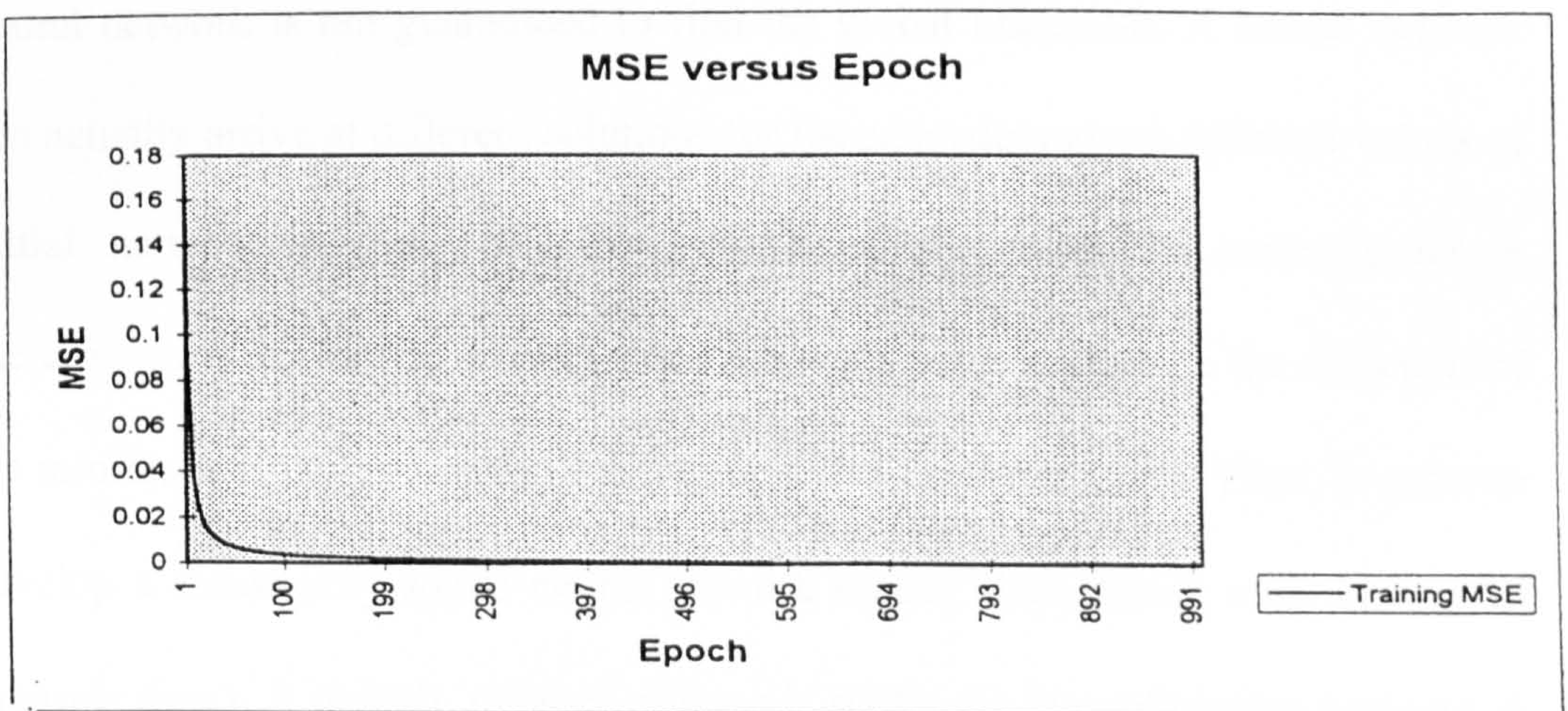
Table 7.4: Training and Testing Results using the 14 Selected Variables used in MDA Model Development

Figures 7.3 and 7.4 show the training curves for the networks with one and two hidden layers respectively. The initial testing results were satisfactory, and hence the analysis could proceed to Step 3 as presented in Fig. 7.2.



Best Network	Training
Epoch #	995.0000
Minimum MSE	0.0001
Final MSE	0.0001

Fig. 7.3: Training Curve of the Network using the 14 Selected Variables used in the MDA Model Development (1 Hidden Layer)

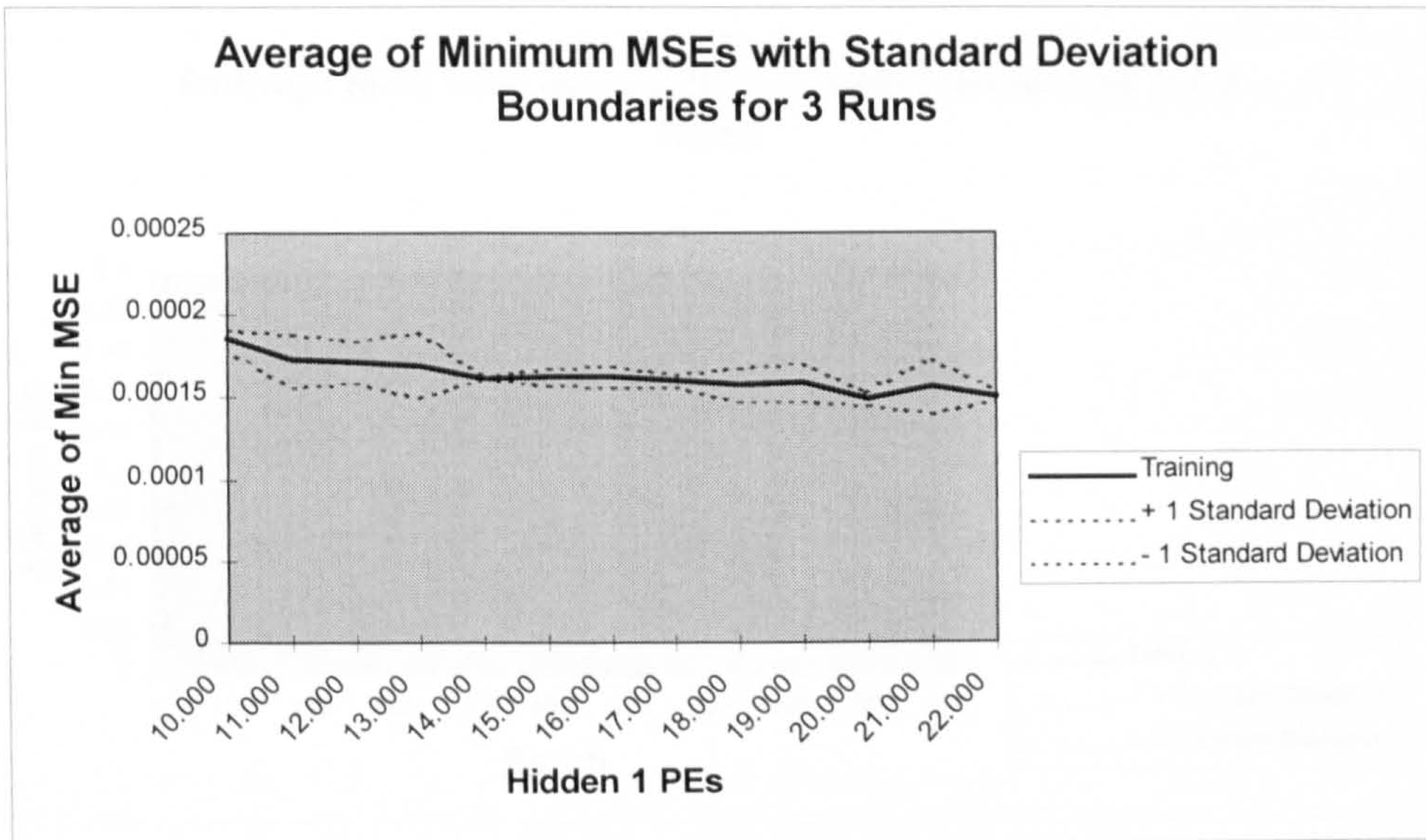


Best Network	Training
Epoch #	998.0000
Minimum MSE	0.0005
Final MSE	0.0005

Fig. 7.4: Training Curve of the Network using the 14 Selected Variables used in the MDA Model Development (2 Hidden Layers)

7.6.1.2 Step Three and Step Four: Optimising Network and Testing Results

As indicated in Table 7.4, the testing accuracy was the same for both the networks with one and two hidden layers, therefore, the network with one hidden layer was selected to be optimised. The first stage in optimising a network is to identify the optimum number of PEs. The NeuroSolution package provides a batch training function for this purpose. The network is trained under the same specification except the number of PEs in the hidden layer was changed from 10 to 22 with increments of 1 for each run of training. The optimum number of PEs was selected based on the MSE. Figure 7.5 gives the training curves and the simulation computer print-outs are appended in Appendix P. It was found that the best network (based on MSE) was obtained with 21 PEs. A new network using one hidden layer and 21 processing elements was then built. Unlike a linear system, a neural network is not guaranteed to find the global minimum. A neural network can actually arrive at different solutions for the same data given different values of initial network weights. The initial network weights define the starting point on the error surface. As the network transverses the error surface in the direction of the minimum error, it sometimes gets caught in a local minimum. Thus, in order to develop a statistically sound neural network model, the network must be trained multiple times. A default number of three is set by the NeuroSolution package. A multiple of three runs were applied and the best network obtained was tested against the training sample and testing sample. Figure 7.6 gives the training curves for the verification of the Best Network. The simulation computer print-outs are given in Appendix Q and summarised in Table 7.5.



Best Network	Training
Parameter Value	21.0000
Run #	2.0000
Epoch #	994.0000
Minimum MSE	0.0001
Final MSE	0.0001

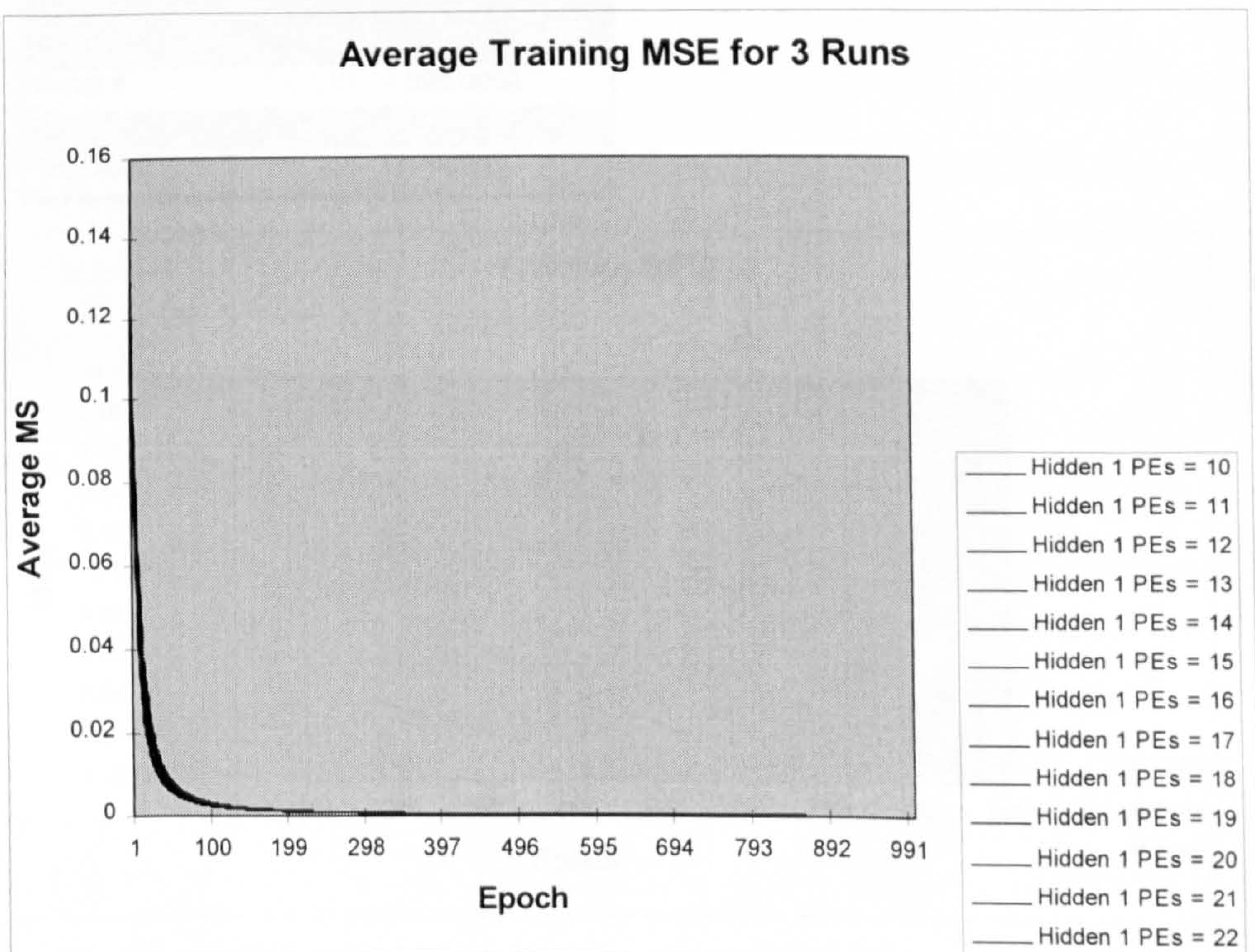
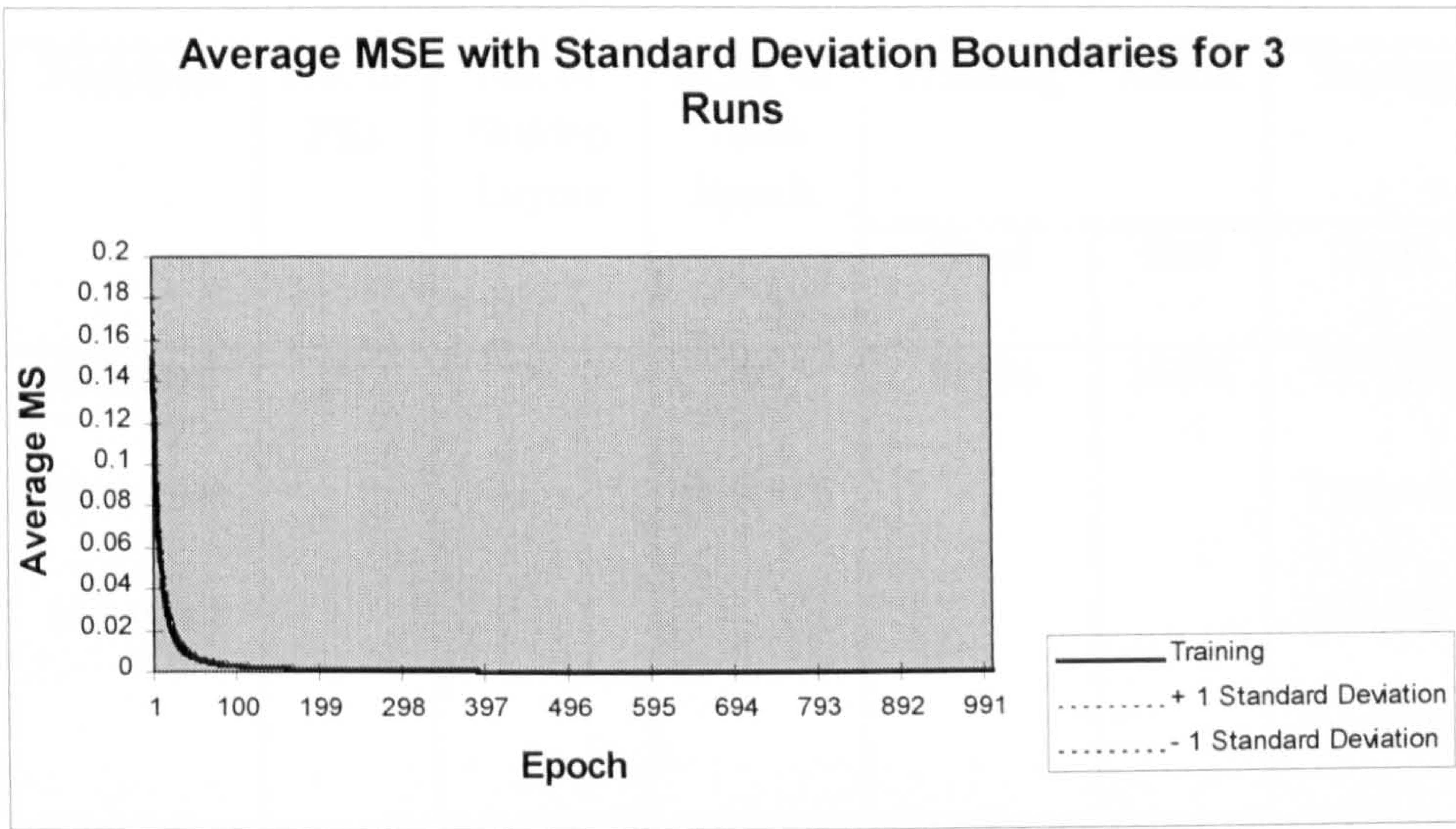


Fig 7.5 Optimising the Number of Processing Elements



All Runs	*Training Minimum*	*Training Standard Deviation*
Average of Minimum MSEs	0.0002	0.0000
Average of Final MSEs	0.0002	0.0000

Best Network	*Training*
Run #	2.0000
Epoch #	995.0000
Minimum MSE	0.0002
Final MSE	0.0002

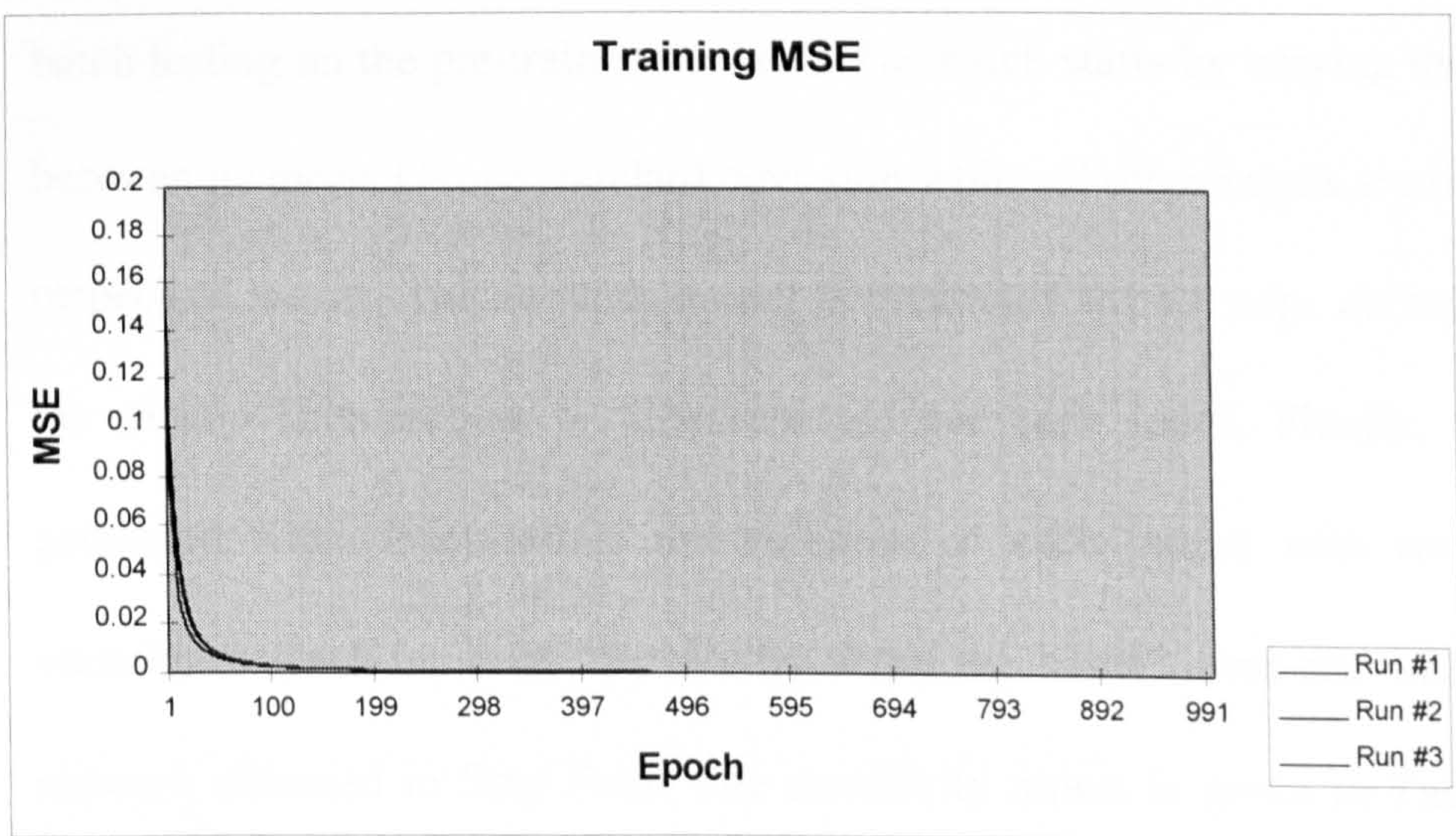


Fig 7.6: Verification of the Best Network

Variables	No. of PEs	No. of Hidden Layers	MSE @ 1000 Epoch	Training Result		Testing Result	
				Good	Bad	Good	Bad
Selected Variables (14 nos.)	21	1	995/ 0.0002	100%	100%	77.78% Projects 50, 54 incorrect	100%

Table 7.5: Training and Testing Results of the 'Best' Network (21of PEs and 1 Hidden Layer)

7.6.1.3 Step Five: Sensitivity About the Mean

The NeuroSolution package provides an useful tool for identifying important variables: the "Sensitivity about the Mean". The sensitivity analysis was run by batch testing on the pre-trained network. The batch starts by varying the first input between its mean +/- one standard deviation while all other inputs are fixed at their respective means. The network output is computed for 50 steps above and below the mean. This process is then repeated for each input. Finally, a report is generated which summarises the variation of each output with respect to the variation of each input. A "Sensitivity about the Mean" was run with the 'Best' network obtained in Step Four. The sensitivity report is given in Table 7.6. The computer print-outs are given in Appendix R.

Sensitivity	Good DRS	Order of Importance	Bad DRS	Order of Importance
E_TENIN	0.0029	8	0.0028	8
O_PRWKRE	0.0010	11	0.0006	11
O_COEXP	0.0045	5	0.0049	5
O_C_CLAM	0.0005	13	0.0005	12
P_SELCRI	0.0467	2	0.0434	2
P_DESCH	0.1637	1	0.1513	1
P_REL	0.0007	12	0.0009	10
P_INV_CL	0.0013	10	0.0004	13
R_ADR	0.0004	14	0.0001	14
R_NEG_CL	0.0014	9	0.0013	9
R_MAN_CL	0.0139	3	0.0127	3
R_ADV_CL	0.0035	7	0.0037	7
R_INC_CL	0.0057	4	0.0058	4
R_FUT_CO	0.0038	6	0.0037	6

Table 7.6: Best Network Variables - Sensitivity and Order of Importance

From Table 7.6 above, for both the Good and Bad DRS projects, the top nine sensitive variables were identical. This suggests fairly high consistency in the contribution of these nine variables towards the classification of Good and Bad DRS projects by MLP. It is of great interest to compare the discriminating variables identified in the MDA and MLP. Table 7.7 presents the comparison. Out of the top eight ranked variables, five were in common. One interesting observation from Table 7.6 is that the degree of design changes is extremely high as compared to other variables (four times of the highest sensitive variable). This suggests that this variables may well be the primal variable that trigger dispute and all its associated problems.

Variables	Discriminating Variables (MDA)	Sensitive Variables (MLP)
E_TENIN	*	*
O_PRWKRE		
O_COEXP		*
O_C_CLAM	*	
P_SELCRI		*
P_DESCH	*	*
P_REL	*	
P_INV_CL		
R_ADR	*	
R_NEG_CL		
R_MAN_CL	*	*
R_ADV_CL	*	*
R_INC_CL	*	*
R_FUT_CO		*

Table 7.7: Comparing Sensitive Variables with Discriminating Variables

7.7 A Network with the Eight Discriminating Variables

In the MDA analysis, eight discriminating variables were identified and these are:

E_TENIN;

O_C_CLAM;

P_DESCH; P_REL;

R_ADR: R_ADV_CL; R_INC_CL; R_MAN_CL;

It was then prudent to run a network based on the eight variables and to compare the classification results with the MDA approach. The training and testing results are given in Table 7.8. The simulation computer print-outs are given in Appendix S.

Variables	No. of P.E.	No. of Hidden Layer	MSE @ 1000 Epoch	Training Result		Testing Result	
				Good	Bad	Good	Bad
MDA Identified variables (8 nos.)	16	1	0.0028	100%	100%	66.67% Project No. 49, 54, 55 Incorrect	50% Project No. 58, 59 Incorrect
	16/8	2	0.0111	100%	93.33% Project no. 37 incorrect	77.78% Project no. 54, 55 Incorrect	50% Project no. 58, 59 Incorrect

Table 7.8: Training and Testing Results using the 8 Discriminating Variables identified in the MDA Model Function

It can be seen from Table 7.5 that for the network built with the eight variables, the testing results were less satisfactory than for the network with the 14 variables. When compared with the classification performance of MDA, there were more misclassifications for Bad DRS projects in the testing set.

Closer examination of the particular projects that failed the classification revealed the following comparison:

	MDA		MLP	
	Model Development Sample	Hold-Out Sample	Training Set	Testing Set
Incorrect Classification Project no.	Good DRS: 1,23,33 Bad DRS: 37	Good DRS: 54, 55 Bad DRS 58	Good DRS: Nil Bad DRS; 37	Good DRS: 54,55 Bad DRS: 58,59

Table 7.9: Incorrect Classification under MDA and MLP Compared

Therefore, with the same eight variables, both MDA and MLP had the same classification performance for Good DRS projects in the testing set. However, for the Bad DRS projects, MDA performed better than MLP.

7.8 Summary

Classification through MLP is a handy and useful modelling tool for separating projects of Good DRS from projects of Bad DRS.

In the MLP model developed, project specific variables were indicated as being the most discriminating variables when each type of variables was considered separately. However, the use of project–specific variables could not provide a satisfactory generalisation. The final model, after carrying out refinements and careful variable selection, involved all four types of variables and the testing results for Bad DRS projects was 100%. This was of vital importance as it was desirable to have an accurate assessment in this respect.

In sum, for the same 14 variables after careful selection, MLP performed better than MDA. If only 8 variables are used, then MDA performs better than MLP. In other words, with the eight discriminating variables, classification via the MDA function is more accurate than the MLP network.

It can also be seen that with a large number of variables, increasing the number of hidden layers will improve the training result but with a worse testing result. A situation caused by the noise created by non-critical variables.

In order to test the reliability of the MDA function and the MLP network, the relative importance index method was performed and this is reported in Chapter Eight.

CHAPTER EIGHT
RELATIVE IMPORTANCE INDEX

8.1 Introduction

Relative Importance Index (RII) is a commonly used method in construction for obtaining priority rankings of attributes. This method is particularly useful where a structured questionnaire was used to solicit measurements that are subjective in nature (Holt 1997).

In construction, RII has been used in a wide range of studies. These include, *inter alia*, factors affecting tradesman productivity (Olomolaiye & Price 1988); the relative importance of activities involving construction owners during the construction phase (Abdulaziz & Bubshait 1992), and the relative importance of attributes of alternative dispute resolution processes (Cheung 1998).

This phase of the research study involves the verification of the critical variables identified by the MDA and MLP model. The MDA model function (Section 6.3 refers) includes eight discriminating variables from the fourteen variables screened for model development. For the purpose of ensuring the robustness of the model function, all fourteen variables were included in the verification questionnaire so that comparisons could be made between the critical variables identified by the model and those identified by the project participants. In the questionnaire, against each variable, the respondents were asked to indicate the importance of the variable in affecting the outcome of resolving the largest dispute. The rating was based on a Likert Scale of 1 to 9 (1 = least important, 9 = most important). A copy of the questionnaire is appended in Appendix T.

Relative Importance Index is calculated by the following formula:

$$\mathrm{RII}_a = \frac{\sum_{i=1}^{n} R_{ai}}{Mn} \qquad \text{(equation 8.1)}$$

where,

RII_a: The Relative Importance Index of attribute a.

M: The maximum score obtainable form the rating scale.

n: The total number of responses.

R_{ai}: The rating score against attribute a from respondent i.

8.2 Outline of the RII Study

One of the objectives of this research study was the development of a prediction model that would predict Dispute Resolution Satisfaction (DRS) of construction projects. Two methods were employed for this purpose, MDA and MLP. As summarised in Section 7.8, the testing result obtained from the MDA model was slightly better than the MLP model when the same eight discriminating variables were used as independent variables. The MDA model identified 8 discriminating factors and from the sensitivity analysis carried out by the artificial neural network model, among the top eight sensitive variables identified in the MLP model, five were also discriminating factors.

This part of the research study seeks to verify the robustness of the models by soliciting a Relative Importance Index (RII) for the fourteen variables previously selected for MDA and MLP model development. The respondents of the model development sample were approached to complete the RII questionnaire as appended in Appendix T.

8.3 RII Summary for Clients' Sample

Variables	Sum of importance rating score	Mean of importance rating score	Standard Deviation	RII	Priority Rankings
E_TENIN	244	4.21	2.13	0.4674	14
O_C_CLAM	366	6.31	1.88	0.7011	2
O_C_COEX	308	5.31	1.81	0.5900	10
O_PRWKRE	306	5.28	2.28	0.5862	12
P_DESCH	381	6.57	2.20	0.7299	1
P_INV_CL	333	5.74	2.00	0.6379	6
P_REL	347	5.98	1.77	0.6648	5
P_SELCRI	275	4.74	1.81	0.5268	13
R_ADR	311	5.36	2.57	0.5958	9
R_ADV_CL	317	5.47	2.49	0.6073	7
R_FUT_CO	306	5.28	2.07	0.5862	11
R_INC_CL	358	6.17	1.70	0.6858	3
R_MAN_CL	349	6.02	1.93	0.6686	4
R_NEG_CL	316	5.45	2.00	0.6054	8

Table 8.1: RII of the 14 Selected Variables (Clients' Sample)

61 project data were obtained and used for developing and testing of the MDA and MLP models. Previous respondents were approached again to fill the RII questionnaire. The RII for three projects could not be obtained due to the departure of staff who previously completed the data collection questionnaire. A total of 58

projects data were thereby obtained. The results of the RII obtained are given in Table 8.1.

Owing to the fact that RII is a rather subjective measurement tool, the indices obtained tend to cluster around a certain range, 5 to 8 in this case. Hence it is more meaningful to consider the top eight ranked variables as a group instead of comparing each and individual variables in isolation.

8.4 Comparison of the Critical Variables (MDA, MLP and RII)

The following Table 8.2 presents the comparison of the critical variables identified in the three studies (MDA, MLP and RII). It can be seen that among the respective top eight ranked critical variables identified by MDA and RII, six were common. These common variables included:

- The claim consciousness of the contractor;
- The degree of design changes;
- The working relationship between the project personnel;
- The degree of involvement of external advisor ;
- The tangible and intangible incentives for the client to settle;
- The involvement of senior management of the client in the resolution process.

Likewise, for MLP & RII, when the 8 highest ranked RII scores were compared with the sensitive variables, four of them were in common. These included:

- The degree of design changes;
- The degree of involvement of external advisors;
- The tangible and intangible incentives for the client to settle;

- The degree of involvement of senior management in the resolution process.

In fact, these four variables were also discriminating variables identified in the MDA model.

Variables	MDA (significance)	RII (RII Score)	MLP (Sensitivity)
E_TENIN	1 (0.60115)	14 (0.4674)	8 (0.0029)
O_C_CLAM	3 (0.48236)	2 (0.7011)	13 (0.0005)
O_C_COEX		10 (0.5900)	5 (0.0045)
O_PRWKRE		12 (0.5862)	11 (0.0010)
P_DESCH	6 (0.29049)	1 (0.7299)	1 (0.1637)
P_INV_CL		6 (0.6379)	10 (0.0013)
P_REL	5 (0.31197)	5 (0.6648)	12 (0.0007)
P_SELCRI		13 (0.5368)	2 (0.0467)
R_ADR	8 (0.24511)	9 (0.5958)	14 (0.0004)
R_ADV_CL	4 (0.38400)	7 (0.6073)	7 (0.0035)
R_FUT_CO		11 (0.5862)	6 (0.0038)
R_INC_CL	2 (0.59561)	3 (0.6858)	4 (0.0057)
R_MAN_CL	7 (0.26735)	4 (0.6686)	3 (0.0139)
R_NEG_CL		8 (0.6054)	9 (0.0014)

Table 8.2: Comparing the Top Eight Ranked Variables (The numeric value being the priority ranking)

Hence, in addition, better testing results were obtained from MDA than from MLP. In terms of RII, the critical factors identified in RII matched better with the MDA model (6 out of 8) as compared with MLP (4 out of 8).

8.5 RII Summary for the Contractors' Sample

The MDA and MLP model were developed from the perspective of clients. Nevertheless, it is of interest to have a priority rankings from the contractors' perspective. In this context, another RII questionnaire for use by contractors was developed employing the same fourteen variables with adjustments to reflect the respondents being contractors. Various contracting organisations were approached and 31 project data set were obtained. The RII values obtained are shown in the following Table 8.3.

Variables	Sum	Mean	Standard Deviation	RII	Priority
E_TENIN	97	3.13	1.98	0.3477	14
O_C_CLAM	205	6.61	1.52	0.7348	7
O_C_COEX	216	6.97	1.40	0.7742	3
O_PRWKRE	201	6.48	1.67	0.7204	9
P_DESCH	208	6.71	1.68	0.7455	6
P_INV_CL	202	6.52	2.16	0.7240	8
P_REL	212	6.84	1.27	0.7599	5
P_SELCRI	162	5.23	2.16	0.5806	11
R_ADR	147	4.74	2.39	0.5269	13
R_ADV_CO	152	4.9	2.39	0.5448	12
R_FUT_CL	193	6.23	2.08	0.6918	10
R_INC_CO	213	6.87	1.94	0.7634	4
R_MAN_CL	219	7.06	2.28	0.7849	1
R_NEG_CO	218	7.03	1.43	0.7813	2

Table 8.3: RII Values of the 14 Selected Variables (Contractors' Sample)

In addition, for the purpose of detecting whether there exists a `consistent' pattern between the important factors that influence the outcome of a dispute resolution process, the two sets of RII scores were compared. Table 8.4 presents the comparison.

Variables	RII (Clients' Sample)	RII (Contractors' Sample)	Variables
E_TENIN	14 (0.4674)	14 (0.3477)	E_TENIN
O_C_CLAM	2 (0.7011)	7 (0.7348)	O_C_CLAM
O_C_COEX	10 (0.5900)	3 (0.7742)	O_C_COEX
O_PRWKRE	12 (0.5862)	9 (0.7204)	O_PRWKRE
P_DESCH	1 (0.7299)	6 (0.7455)	P_DESCH
P_INV_CL	6 (0.6379)	8 (0.7240)	P_INV_CL
P_REL	5 (0.6648)	5 (0.7599)	P_REL
P_SELCRI	13 (0.5368)	11 (0.5806)	P_SELCRI
R_ADR	9 (0.5958)	13 (0.5269)	R_ADR
R_ADV_CL	7 (0.6073)	12 (0.5448)	R_ADV_CO
R_FUT_CO	11 (0.5862)	10 (0.6918)	R_FUT_CL
R_INC_CL	3 (0.6858)	4 (0.7634)	R_INC_CO
R_MAN_CL	4 (0.6686)	1 (0.7849)	R_MAN_CL
R_NEG_CL	8 (0.6054)	2 (0.7813)	R_NEG_CO

Table 8.4: RII Values compared (Clients' & Contractors' Sample)

Similarly, when the top eight factors were considered as a group, it can be seen from Table 8.4 that among the top eight ranked variables, seven of the top eight group were common (although their rankings are different). In relation to the variance, the model development group considered that the involvement of external claim advisors during the resolution process has a bearing on the resolution outcome. For the contractor sample, the experience of the contractor with the type of project involved was important.

8.6 Summary

The reliability of the important variables obtained from the RII study on the Model Development Sample was supported by the RII study with an independent sample of projects from the contractors' perspective. Out of the top eight critical variables, seven were common between the two studies. The matching percentages of the top eight critical variables obtained form MDA, MLP and the two RII Studies are presented in Table 8.5.

The RII study also confirms six of the eight discriminating variables identified in the MDA model. These six variables are:

* The claim consciousness of the contractor;
* The degree of design changes of the project;
* The working relationships between the project personnel;
* The use of external claim advisors in the resolution process;
* The tangible and intangible incentives for the client to settle;
* The involvement of the senior management in the resolution process.

The same six were also ranked among the top eight important variables from the Contractors' Sample.

However, there remained two variables within the MDA model not rated as important from the RII Study. These two variables are discussed seriatim.

	MDA	MLP	RII (Clients' Sample)	RII (Contractors' Sample)
MDA	-	62.5% (5/8)	75% (6/8)	62.5% (5/8)
MLP		-	50% (4/8)	50% (4/8)
RII (Clients' Sample)			-	87.5% (7/8)
RII (Contractors' Sample)				-

Table 8.5: Percentage Matching of Critical Variables between MDA, MLP and RII Studies

Referring to Table 8.2, these two variables were:

* The use of ADR in the conditions of Contract;

* The change in Tender Price Index.

The requirement of using ADR in Conditions of Contract was ranked 8th in the MDA Model and 9th in the RII Study. Furthermore, its RII score and that of the 8th ranked factor (negotiation skill of the clients' negotiating team) was only marginal: 0.6073 vs 0.6054. Hence this slight departure should be acceptable.

As for the variables 'Change in Tender Price index', this variable provided the greatest discriminating power in the MDA study. However, in the RII study, it was ranked as the least important. It may be explained that for this variable, Change in Tender Price Index, an increase implies a rising market which usually suggests a high availability of profitable opportunities. This should have a psychological and hidden bearing on the disputants, particularly on the contractors' side, in the potential for achieving early settlement. The client may not beware of this hidden effect even if it already exists.

Furthermore, RII is a subjective measurement, respondents tended to ignore this environment variable and responded using their cognitive reasoning. Above all, the RII Study confirmed six of the eight discriminating variables identified in the MDA model.

The result of the RII study reinforced the reliability of the MDA model. Chapter Nine is devoted to the interpretation of the discriminating variables identified by the discriminant function.

CHAPTER NINE
INTERPRETATION OF THE DISCRIMINATING VARIABLES FROM MDA

9.1 Introduction

Chapter Eight reported the satisfactory verification by the RII study of the discriminating variables identified by the MDA model. A brief explanation of the variables was given in Section 6.5. Interpretation of the discriminating variables can be enhanced if the underlying construct of the variables can be unveiled. A principal component factor analysis was performed for this purpose.

9.2 Principal Component Factor Analysis (PCFA)

9.2.1 Uses of Principal Component Factor Analysis

Factor analysis is a generic name given to a class of multivariate statistical methods whose primary purpose is to define the underlying structure in a data matrix. Broadly speaking, it addresses the problem of analysing the structure of the interrelationships (correlations) among a large number of variables by defining a set of common underlying dimensions, known as factors. With factor analysis, it is possible to identify the separate dimensions of the structure and then determine the extent to which each variable is explained by each dimension. Once these dimensions are determined, interpretation of the variables can be done by summarising the data according to the dimensions.

Successful use of the above method to enhance interpretation can be found in Cheung (1998) where the attributes of alternative dispute resolution techniques are ranked. In a similar context, the special features of an innovative dispute resolution process, dispute resolution advisor system, are prioritised (Cheung & Yeung 1998). The above method had also been used in grouping the behaviour of mediators (Carnevale, Lim & McLaughlin 1989) so as to enable an assessment to be made of the effectiveness of the strategies used. Kaming, Olomolaiye, Holt and Harris (1997) also used this methodology to investigate the relationship between project delay and the causes of delay.

9.2.2 Steps in a Principal Component Factor Analysis (PCFA)

Factor analysis is used for an exploratory purposes and usually proceeds in four steps. In the first step, the correlation matrix for all variables is computed and a corresponding measure of sampling adequacy is considered. In the second step, factor extraction is to be performed. Rotation, which focuses on transforming the factors so as to make them more interpretable, is the third step. The fourth step, involves the interpretation of the factors. A PCFA was first conducted with data of the eight discriminating variables from the model development sample. However, the Measure of Sampling Adequacy (MSA) obtained was less than 0.5 (the acceptable threshold figure). As MSA increases with sample size (Hair, Anderson, Tatham & Black 1995) and the discriminant model function (Section 6.3 refers) performs well in both the model development sample and the hold-out sample, a PCFA was performed using the whole data set of 61 projects. The PCFA was conducted using the SPSS package and the computer print-outs for the same are given in Appendix V.

9.3 Examination of Data

The suitability of data to be used in a principal component factor analysis is assessed through examination of the determinant of the correlation matrix. Table 9.1 gives the correlation matrix. The determinant of the correlation matrix was 0.4640843 and therefore considered adequate (>0.00001). The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.55025, which is greater than the threshold requirement of 0.5. In addition, the significance of the Bartlett Test of Spericity was low (0.03201). These suggested the adequacy of the data set to perform a PCFA.

9.4 Extraction of Factors

The number of factors that can be extracted from any factor analysis is equal to or less than the number of variables involved. The most commonly used criterion is the Eigenvalue of the factor which represents the amount of variance accounted for by a factor. Factors having Eigenvalue greater than 1 are considered significant and all factors with Eigenvalues less than 1 are considered insignificant and are discarded. Basing on this criterion, three factors were extracted. The initial statistics of the PCFA are given in Table 9.2.

	E_TENIN	0_C_CLAM	P_DESCH	P_REL	R_ADR	R_ADV_CL	R_INC_CL	R_MAN_CL
E_TENIN	1.00000							
0_CLAM	-.18814	1.00000						
P_DESCH	-.01292	.14083	1.00000					
R_REL	.03934	-.08697	.16979	1.00000				
R_ADR	.10924	-.15621	.00797	.06041	1.00000			
R_ADV_CL	.00058	-.05392	.29407	.13687	.16274	1.00000		
R_INC_CL	-.03026	-.06852	.25511	.19523	.15294	.20714	1.00000	
R_MAN_CL	-.07643	.13753	.11284	.33968	.29760	.30568	.23125	1.00000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy =.55025

Barlett Test of Sphericity = 43.37443, Significance =.03201

Table 9.1: Correlation Matrix of the Eight Discriminating Variables (61 Cases)

Factor	Eigenvalue	Percentage of Variance	Cumulative Percentage
1	2.00561	25.1	25.1
2	1.33667	16.7	41.8
3	1.02923	12.9	54.6
4	.92295	11.5	66.2
5	.87348	10.9	77.1
6	.77508	9.7	86.8
7	.62912	7.9	94.7
8	.42786	5.3	100.0

Table 9.2: Initial Statistics of PCFA for the Discriminating Variables

9.5 Rotation of Factors

In order to achieve factor loadings that are easier to interpret, a Varimax rotation was conducted on the factors, i.e. to minimise the number of factors on which the determinants had high loadings. The rotated factor matrix is given in Table 9.3. The groupings of variables for three factors are illustrated by the respective shadings in the rotation matrix. A taxonomy is proposed for the factors:

Factor One: Substantive Influence

Factor Two: Facilitation

Factor Three: Indirect Influence

The taxonomy was chosen to reflect the relationship between the factors and the process through which the dispute is resolved. In addition, the Factor Scores (FS) basing on the RII study (Chapter Eight refers) were computed by the following formula:

$$FS_i = \frac{\sum_{j=1}^{N_i} RII_{ij}}{N_i} \qquad \text{(Equation 9.1)}$$

Where,

FS_i: Factor Score of Factor i.

RII_{ij}: RII of variable j grouped in Factor i.

N_i: Number of variables grouped in Factor i.

	Factor 1	Factor 2	Factor 3
P_DESCH	.80178	-.26286	.11322
R_ADV_CL	.61318	.22954	-.02630
R_INC_CL	.60449	.18187	-.06713
P_REL	.44487	.33189	-.04941
R_ADR	.02510	.74607	-.24039
R_MAN_CL	.32516	.73784	.31100
O_C_CLAM	.02833	-.12802	.78169
E_TENIN	.06523	-.05576	-.71160

Table 9.3: Rotated Factor Matrix for the Discriminating Variables

Applying equation 9.1, the Factor Scores were calculated and the rankings of the factors are given in Table 9.4.

9.6 Interpretation of Factors

Factor	Variables	RII	Factor Score	Ranking
One	P_DESCH	0.7299	0.6719	1
	R_ADV_CL	0.6073		
	R_INC_CL	0.6858		
	P_REL	0.6648		
Two	R_ADR	0.5958	0.6322	2
	R_MAN_CL	0.6686		
Three	O_C_CLAM	0.7011	0.5843	3
	E_TENIN	0.4674		

Table 9.4: Factor Scores and Rankings

9.6.1 Factor One: Substantive Influence

In Chapter One, construction disputes were analysed using a fault tree representation. It is suggested that a triggering event must be present to trigger the contract dispute resolution machinery. Design changes (the first variable included in Factor One) were by far the most common triggering event.

The outcome of a resolution process is subject to many influences, in particular, those from the people involved in the resolution process. Factor One addresses those substantive influences. These influences are substantive because they are fundamental to decision making.

The use of claim advisor often fuels the tension and hinders resolution. In fact, it has been suggested that a claim advisor should only be involved for giving advice after a dispute has arisen (Jahren & Dammeier 1990).

A desire to settle is fundamental to any prospective settlement. These desires may be derived from tangible or intangible incentives associated with a settlement. Preservation of relationships is one of those intangible incentive. The issue of relationships has attracted wide attention. In the 70's, the concept of relational contracting had aroused great debate among legal academics.

Macneil (1969) challenged the classical contract law which emphasises freedom of choice. According to Macneil (1969) and supported by Macaulay (1975) with empirical observations that co-operation and preservation of relationship are the norm in contractual behaviour. From there emerged the concept of relational contracting.

Relational contracting is characterised by the use of 'Best Effort' clauses and is particularly suitable for long-terms contract that are complex and involve a high level of uncertainty (Goetz & Scott 1981). Many large scale construction projects fit nicely into this relational paradigm (Alsagoff & McDermott 1994).

The planning for dispute resolution in relational contracting is critical, as dispute resolution provision in such contracts serves the gap filling function when un-anticipated contingencies eventuate during project currency. With the use of transaction characteristics as planning parameters, Cheung (1997) proposed the use of alternative dispute resolution techniques to be used in relational contracts. This neatly brings us to Factor Two.

9.6.2 Factor Two: Facilitation

Factor Two is labelled Facilitation to reflect the planning and proactive efforts that could bring positive effects towards dispute resolution. The use of ADR, coupled with senior management involvement during the resolution process demonstrates how these planning efforts would facilitate amicable dispute resolution outcomes. The positive influence of the early and heavy involvement of senior management has long been recognised (Goldberg 1979, NPWC 1990).

9.6.3 Factor Three: Indirect Influence

Factor Three consists of two variables; claim consciousness and the average change in the tender price index. Claim consciousness somehow manifests the claim management culture of the contracting organisation. Claim conscious contractors are often tough dispute negotiators. However, the cost of pursuing a protracted resolution is always weighted against the market opportunity cost. As suggested in Section 8.6, these indirect influences have psychological effect on the organisation towards dispute resolution.

The order of ranking of the three factors resembles a 3–level influence diagram as shown in Figure 9.1. The concentric circles represent the level of influence, i.e. the inner most circle being the most critical influence upon the outcome of a resolution process.

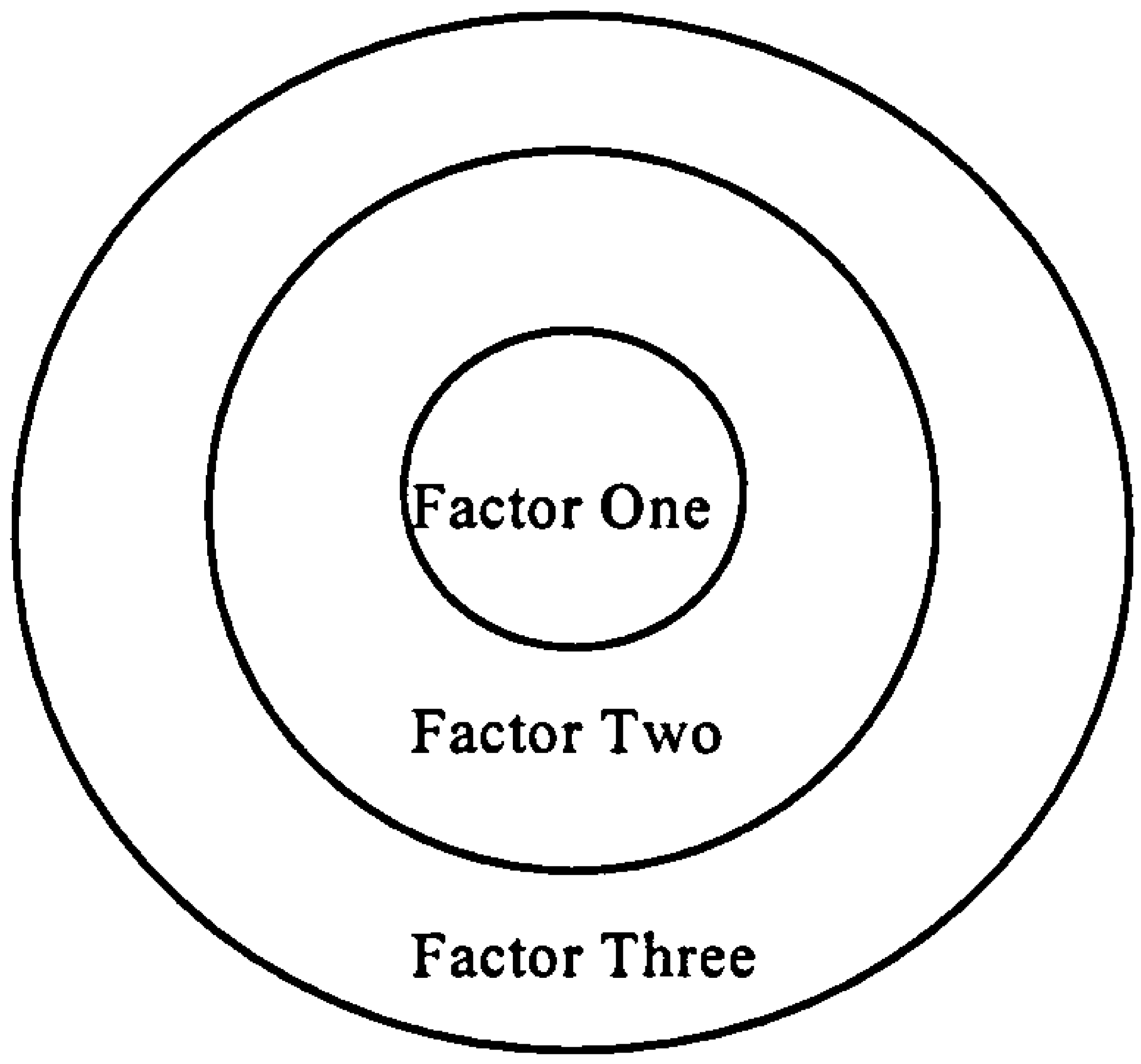


Figure 9.1: Level of Influence of the Factors

This representation is also supported by the rankings of the Factors by Factor Score. Factor Three ranked third in the factor ranking and lies in the outer most circle. Where the contractor is considered to be claim conscious and the construction market is not good, it is perceived that dispute will linger and that it will be difficult to reach a settlement.

However, planning efforts, including the use of alternative dispute resolution techniques and the participation of senior management provide the groundwork for Good DRS project (Factor Two ranked second and lies in the middle of the concentric circles).

Substantive influences lie at the heart of all dispute settlements. No dispute can be settled if the real cause of a dispute is not understood nor will resolution be successful if there exists no desire to settle. Factor One addresses these fundamental concerns.

The PCFA and the Factor Scores computed therefrom enabled a detailed and hierarchical analysis of the discriminating variables. In the following Section 9.7, the incorrectly classified projects are examined to investigate the reason for misclassification by the model.

9.7 Misclassified Projects Re-visited

According to the interpretation of the MDA model function, the expected values of the discriminating variable measurements should exhibit the following pattern for correct classification:

Discriminating Variables	Group 0 (Good DRS)	Group 1 (Bad DRS)
E_TENIN	High	Low
O_C_CLAM	Low	High
P_DESCH	Low	High
P_REL	Low	High
R_ADR	Low	High
R_ADV_CL	Low	High
R_INC_CL	Low	High
R_MAN_CL	Low	High

Case	E_TENIN	O_C_CLAM	P_DESCH	P_REL	R_ADR	R_ADV_CL	R_INC_CL	R_MAN_CL
1	4.519	2.73	0.23	3	5	2	2	4
23	8.941	0.136	0.25	3	4	1	6	1
33	8.263	0.9	0.025	3	4	5	3	5
37	3.25	0.045	0.2	3	4	1	1	3
54	4.786	0.413	0.2	4	5	3	5	5
55	7.813	0.765	0.17	3	3	6	5	5
58	8.625	0.015	0.13	4	2	1	5	4

Table 9.5: Misclassified Projects (With Possible Explanation for Misclassification Shaded)

Table 9.5 displays the discriminating variable measurements of the seven misclassified projects (four from the model development sample and 3 from the hold-out sample).

Case	Actual	Classified	Departure from Model expectation
1	0	1	• High level of claim consciousness. • Inadequate ADR provision in contract. • Lack of senior management involvement
23	0	1	• Inadequate ADR provision in contract. • Lack of incentive to settle.
33	0	1	• Inadequate ADR provision in contract. • Too heavy involvement of claim advisor. • Lack of senior management involvement.
37	1	0	• No involvement of claim advisor. • Strong incentive to settle.
54	0	1	• Bad relationship between project personnel. • Inadequate ADR provision in contract. • Lack of incentive to settle. • Lack of senior management involvement.
55	0	1	• Heavy involvement of claim advisor. • Lack of incentive to settle. • Lack of senior management involvement.
58	1	0	• Good market environment. • Sufficient ADR provision in contract. • No involvement of claim advisor.

Table 9.6: Explanations for Misclassified Projects

9.8 Summary

The interpretation of the MDA model function has been enhanced by way of grouping of the discriminating variables into factors. The grouping was performed using a principal component factor analysis, a proven statistical method. The grouping also enabled a hierarchical influence explanation to be constructed. Where misclassification occured, the corresponding variable measurements exhibited at least two departures from the model expectation. For example, project no. 1 was classified as good DRS in accordance with the DRS definition while the MDA model classified the project as bad DRS. The departure was the result of the contracting organisation is claim conscious (Factor Three). The contract did not provide adequate ADR provision to facilitate an amicable resolution (Factor Two). Significantly, there was a lack of senior management involvement during the resolution process (Factor One).

CHAPTER TEN
CONCLUSIONS AND RECOMMENDATIONS

10.1 Introduction

This research originated from the desire to understand better construction dispute resolution which includes, inter alia, the nature of construction disputes and factors affecting the outcome of a dispute resolution process. It also sought to provide a quantitative tool for predicting construction clients' project dispute resolution satisfaction.

That most project personnel seek to refrain from involvement in dispute resolution may be because of a lack of contractual knowledge or the intimidating 'failure' label attached with occurrence of a dispute. This attitude has anchored construction dispute resolution on a legal platform. However, from a proper perspective, resolving construction disputes should just be a special type of problem solving. Few construction disputes require decision on points of law. It is on this management dimension that this research programme was designed.

10.2 Contributions of this Research

In response to the aim and objectives as set out in Chapter Two of this thesis, this research has produced:

i) A conceptual definition of a construction dispute.

A dispute is usually described by its subject-matter. This simplification fails to recognise that, in order to put dispute resolution onto the contractual track, it is necessary to have the pushing drive from conflict as well as the actual invoking of the contractual machinery. The use of a fault tree representation allows the definition of a construction dispute be put in perspective (refers Section 1.2).

ii) The identification and provision of a framework for factors that would affect dispute resolution outcome.

Chapter Four presented a literature review and a pilot study providing the theoretical underpinnings for a four-category framework for factors affecting dispute resolution outcomes (refers Figure 4.1).

iii) A quantitative model for the prediction of DRS.

In this research, good dispute resolution satisfaction is defined as the largest dispute being resolved within the site level. The classification of DRS for a project follows a binary scale of [0,1]. Both multivariate discriminant analysis and artificial neural networks can perform the classification function. The MDA prediction model contains eight independent variables (refers Section 6.3). In MLP, the use of fourteen variables provides the `Best Network' (refers Section 7.6).

The reliability of the MDA and MLP models were tested using a relative importance index (RII) study. The RII were sought from projects that form the data set for both the MDA and MLP-ANN studies. The robustness of the RII study was reinforced by subsequent RII survey with an independent sample of contractors. The RII studies support the discriminating variables identified in the MDA model.

iv) Identification of variables that discriminate between good and bad DRS projects.

In the preliminary analyses performed using MDA and MLP, no single type of variable satisfactorily offers the separation power between good and bad DRS projects. In the final MDA model function and the MLP 'Best Network' the set of critical variables involved all four types of variables as categorised by the conceptual framework proposed in Chapter Four.

As identified by the MDA model function and supported by the RII studies, the discriminating variables include:

E_TENIN: Average change in tender price index during the contract period.

O_C_CLAM: The claim consciousness of the contractor.

P_DESCH: The degree of design changes.

P_REL: The relationship between the project personnel.

R_ADR: The use of ADR as provided in the contract.

R_ADV_CL: The degree of involvement of external claim advisor.

R_INC_CL: The incentive of the client to settle during the resolution process.

R_MAN_CL: The degree of involvement of senior management during the resolution process.

Changes in the tender price index reflect the availability of construction works in the market. The opportunity cost of pursuing a protracted dispute resolution process increases in a prosperous market and it is against commercial sense not to reach an early settlement. Desire to settle is also affected by the claim culture of the contracting organisation. Claim–aggressive contractors often, in return, receive severe reactions from the clients, the perfect recipe for conflict to flourish. It is almost an un-refuted fact that design changes are the seed of most construction disputes. Changes cause disruption and necessitate alteration, thus inevitably resulting in an increase in cost. The responsibility for the cost increase is the most uncompromising issue in the resolution process, with the incidences of disputes increasing with the number of design changes and vice versa. The sensitivity of variable (degree of design changes) in distinguishing Good DRS and Bad DRS projects is overwhelming and suggests that design changes being the primal root to the dispute saga. Construction activities involve the co-ordinated efforts of project personnel. Harmonious relationships among project participants, particularly those between the two contracting camps, facilitate a problem–solving approach towards disagreements and differences, thus avoiding escalation into disputes. The use of alternative dispute resolution techniques in construction is a notable example of resolution process improvement. Great hope has been given by the industry that the use of ADR, both voluntary and compulsory, would prevent disputes being argued in lengthy and costly arbitration and litigation processes. It is believed that the use of external claim advisors often fuel the antagonism during a resolution process and thus bring negative effects upon the outcome. In fact, construction activities are commercial transactions, and construction disputes cannot be resolved if handled by persons without the incentive to settle. Furthermore, important decisions need to be made in a resolution process, thus it is essential that dispute negotiators possess the authority to make such critical decisions. In this connection, a high degree of involvement of senior management is critical in any dispute resolution process.

To put these eight discriminating variables into context, a principal component factor analysis was performed on the eight discriminating variables. This enabled the hierarchical order of importance of the extracted factors (in terms of factor scores) to be established. It was found that dispute resolution outcome is most critically affected by the set of substantive influences derived from the motives of the people involved. On the second level, facilitation of settlement can be effected with the use of ADR techniques and the involvement of the clients' senior management. On the third level, the claim culture of the contractors and the work market availability will also have an effect on the resolution outcome.

To summarise, the fault tree representation of construction disputes indicates that all three ingredients; triggering event, conflict and contract provision must be present for a construction dispute to occur. It needs little explanation that during a construction process, triggering events like variation instructions are likely to happen. In addition, it would be surprising to find any properly written conditions of contract not having a dispute resolution/settlement clause in which the mechanism for crystallising a dispute is detailed.

In order to reduce the chance of having a construction dispute, management effort should thus be targeted to control the third ingredient of a construction dispute, i.e. to reduce the level of conflict. In this respect, the fault tree representation provides valuable insight for management action.

The outcome of a dispute resolution process depends on many interrelated factors, some of which are controllable and some otherwise. Environment–specific variables are typically uncontrollable. Similarly, organisation–specific variables address the nature and characteristics of the contracting parties and therefore are not expected to be altered easily.

Project and resolution process–specific variables can be controllable and planning efforts can bring positive feedback in terms of project dispute resolution. Project–specific variables relate to the project attributes, many of which are determined by the clients before construction work begins. The time allowed for the project preparation is a notable example. Thorough preparation improves clarity in documentation, enhances work scope definition and reduces design changes during construction. In a similar context, criteria for the selection of contractors and the risk allocation policy are all under the control of the client. The MLP model identifies that project specific variables offer the highest separation power when only one type of variable is considered.

Likewise, process–specific variables are found to be most discriminating when considered in isolation in the MDA preliminary analyses. As long as the resolution process is not governed by any statutory framework, as in the case of arbitration and litigation, the disputants should be able to exert the highest degree of control. The correlation between process–specific variables and dispute resolution outcomes is therefore sound in theory and supported by the empirical evidence concluded in this research.

The MDA model function provides a predictive tool for use by construction clients to predict the dispute resolution satisfaction of a construction project. The model function is:

$$
\begin{aligned}
Z = & -0.1672046\ (E\_TENIN) + \\
& 0.1006615\ (O\_C\_CLAM) + \\
& 4.3815758\ (P\_DESCH + \\
& 0.2504613\ (P\_REL) + \\
& 0.1290774\ (R\_ADR) + \\
& 0.3210849\ (R\_ADV\_CL) + \\
& 0.4091552 (R\_INC\_CL) + \\
& 0.1794842 (R\_MAN\_CL) + \\
& -2.9962721
\end{aligned}
$$

The hit rates achieved by the model function in the model development sample and hold-out sample are respectively:

Hit Rates

	Model Development Sample	Hold-out Sample
Good DRS Project	90.9% (30 out of 33)	77.77% (7 out of 9)
Bad DRS Project	93.3% (14 out of 15)	75% (3 out of 4)
Overall	91.67% (44 out of 48)	76.92% (10 out of 13)

There were four bad i.e. adverse DRS projects in the hold-out sample and if prediction is carried out purely by chance, then the probability of making a correct prediction is 4/13 i.e. 30.77%. With the aid of the model function, the correct percentage sharply rises to 75%.

Similarly, for Good DRS projects, the model prediction accuracy (77.77%) achieved in the hold-out sample is higher than the 69.23% (9/13) by pure guess work.

The use of the model function to predict DRS is subject to certain limitations. Firstly, the model was developed with historical project data, with data such as changes in tender price index, claim consciousness and degree of design changes being readily available.

If the model function is to be used for prediction purposes, the measurements for the above variables need to be estimated. For example, changes in the tender price index can be interpolated from the movement trend of the index. Expert judgement can be sought to assess the degree of changes based on the amount of preparation work completed. Past record of claim submissions should be available from the contractor. The remaining five independent variables included in the MDA function are measured on a Likert Scale and care needs to be exercised to keep subjectivity to the minimum.

10.3 Recommendations for Further Research

This research has approached the thorny issue of construction dispute resolution from a management focus. It is suggested that a problem solving approach towards dispute resolution is appropriate and beneficial to the well being of the construction industry. In addition to the identification of discriminating variables that affect project dispute resolution satisfaction, this research also brings out the following areas that warrant further research:

i) The fault tree representation of construction disputes provides a structure by which the likelihood of construction disputes can be assessed, through estimating the probability of occurrence of the basic events. The model can also be extended to incorporate a fuzzy likelihood algorithm to reflect the fuzzy nature of the basic events. Potential also exists for the model be developed into an expert system.

ii) For the improvement of dispute resolution satisfaction, controlling the conflict level has been identified as the area where management effort should be directed. Research in procurement methodology is the logical start. The concepts of relational contracting offer the essential academic input and research on the implementation issues, in particular, the corresponding legal implications shall be of practical and commercial value.

iii) Advocates of ADR celebrate the mandatory requirement on the use of adjudication in all construction contracts under S.108 of the U.K. Housing Grants, Construction and Regeneration Act 1996. This was the first time that the ADR technique gained legal status in the construction industry. This reinforces the finding in this research that the use of ADR can have positive effects on a dispute resolution outcome. ADR is still comparatively new in the construction industry. With increasing use, project participants would become more knowledgeable and conversant with ADR techniques in the future, project dispute resolution satisfaction (DRS) may then be achieved even if ADR processes are involved. It is therefore of great interest to maintain continual research on this trend as this may affect the definition of dispute resolution satisfaction as offered in this research. In addition, the use of ADR provides the environment and atmosphere for amicable settlement. The strategies and skills of the third party neutral are critical to the success or otherwise of the resolution process. Research on the matching of the type of ADR techniques with, *inter alia*, types of dispute and types of contract strategy, remains an unexplored area.

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Appendix A
Data Collection Questionnaire-Preliminary Design

Data Collection Survey

This survey is part of a PhD research programme on the development of a model to predict construction project client's dispute resolution satisfaction. The data collected will be used solely for the aforementioned research purpose and will be treated in strictest confidence. Thank you for your suppport to this research.

Directions:

The following questions survey construction projects for susceptablity of arbitration in resolving construction disputes. The purpose of the survey is to find a correlation between a set of predictive variables and the susceptablility to arbitration to resolve construction disputes. This predictive model will help project arrangemnts to reduce chance to arbitration and thereby improve dispute resolution satisfaction.

Please complete a separate packet for each project to be surveyed. Project should be completed and have no outstanding disputes (not ncessary if the project already had arbitration proceedings held or in progress). Each packet should take approximately 30 minutes to answer. The survey contains 44 questions and is divided into four parts:

* Project information.
* Organisation-specific:- variables that are attributes of those of the client and the contractor.
* Project-specific:- variables that are characteristics of the project under examination.
* Process-specific:- variables that influences the dispute resolution process.

The first section request some background information of the project. The other three sections refer to variables that may affect dispute resolution satisfaction. Each of the questions has a separate scale to which respondents rate their particular project.

The scale ranges from 1 to 6 for all questions (except those questions requiring specific answers).

Section 1: Project Information:

1. Title of the Project:

___

2. Name of contractor:

___

3. Name of client:

___

4. The period that the project was constructed:

___

5. What was the type of project for which this survey was completed?

Public housing		1
Residential		2
Industrial		3
Commercial		4
Civil engineering		5
Other special purpose	___	6

6. What role did the contractor play in this project?

General Contractor		1
Design/Builder		2
Construction Manager		3
BOT		4
Others	___	5

7. The contract value (HK$) of the project was

<10	mill	1
10 -50	mill	2
50 - 100	mill	3
100 - 200	mill	4
200 - 500	mill	5
over 500	mill	6

8. What was the general payment method used by this contract?

Lump sum	1
Cost Plus	2
Schedule of rates	3
Mile stone payment	4
others:	________

9. Consider the largest dispute, at what stage was the dispute resoloved or settled?

No argument over the decision of the contract administrator		1
Negotiation between project personnels		2
ADR process		3
Negotiation after a notice of arbitration served		4
Arbitration		5
litigation		6
Others	________________________	7

10. Generally, how you would describe the satisfaction of the client in connection with dispute resolution?

Satisfied	1
Not Satisfied	2

Section II Organisation - Specific Variables

11. Contractor's work load:
What was the contractor's work load (other than the particular project under examination) during the project duration?

(Low - High) 1 2 3 4 5 6

Total contract sum in hand / Total asset

12. Contractor's profit status:
What was the project profit status of the contractor?

(Substantial Profit - Heavy Loss) 1 2 3 4 5 6

Total profit / Total asset

13. Contractor's claim consciouness:
Was the contractor very claim conscious?

(No - Yes) 1 2 3 4 5 6

14. Contractor's need for the work:
Was the contractor very desparate for work when submitting a tender for the project?

(No - Yes) 1 2 3 4 5 6

15. Contractor's experience with the type of construction:
Did the contractor have experience with the type of construction?

(A Lot - None) 1 2 3 4 5 6

Total contract sum of similar type of construction in the last three years / Total contract sum of all project in the last three years

=

16. Client's (or client's agent) experience with the type of construction:
Did the client have experience with the type of construction?

(A Lot - None) 1 2 3 4 5 6

17. Previous working relationship between the client and the contractor:
Did the contractor and client have previous working relationship?

(A Lot - None) 1 2 3 4 5 6

18. Client's budget constraint:
What was the project budget of the client?

(Very Fiexible - Very Tight) 1 2 3 4 5 6

Estimate / tender sum =

19 The origin of the contractor roganisation:

Japanese	1
Korean	2
Chinese	3
Western	4
Others ________	5

20. The origin of the client organisation:

Japanese	1
Korean	2
Chinese	3
Western	4
Others ________	5

Section III Project - Specific Variables:

21. Design complexity:
Was the design of the project was complex?

(No - Yes) 1 2 3 4 5 6

22. Construction complexity:
Was the construction of the project require complex operations?

(No - Yes) 1 2 3 4 5 6

23. Design changes:
What was the extent of design changes of the project?

(Low - High) 1 2 3 4 5 6

Variation account / Original contract value =

24 Relationship between project personnels:
What was the general relationship beteen the project personnels involved in the project?

(Good - Bad) 1 2 3 4 5 6

25. Degree of nomination:
What was the extent of work executed by nominated subcontractors?

(Low - High)	0 - 20%	1
	21 - 30%	2
	31 - 40%	3
	41 - 50%	4
	51 - 60%	5
	over 60%	6

26. Clarity of contract documents (definition of work):
Was the work scope clearly defined and spelt out by the contract documents?

(Yes - No) 1 2 3 4 5 6

27. Project selection criteria:
What was the basis of selection of the contractor:

(Technical consideration - Price only) 1 2 3 4 5 6

28. Contractor selection process:
What was the tendering process used?

Open tender	1
Invited tender	2
Prequalification	3
Negotiated (without other tenderers)	4
Others	________

29. Conditions of contract:
Was the risks allocation fair and equitable?

(Yes - No) 1 2 3 4 5 6

30. Contractual obligations:
Were the contractual obligations of time and quality considered by both parties?

(Yes- No) 1 2 3 4 5 6

31. Client's involvement in the running of the project:
What was the involvement of the client in the running of the project?

(A Lot - None) 1 2 3 4 5 6

32. Power balance:
Did the client and the contractor have equivalent abilities and resources in order to absorb costs associated with disputes?

(Yes - No) 1 2 3 4 5 6

33. Senior management involvement (Contractor):
Was the Contractor's senior management heavily involveed in the dispute resolution process?

(No - Yes) 1 2 3 4 5 6

34. Senior management involvement (Client):
Was the client's senior management heavily involved in the dispute resolution process?

(No - Yes) 1 2 3 4 5 6

35. Was claim consultant(s) heavily involved in the dispute resolution process (contractor)?

(No - Yes) 1 2 3 4 5 6

36. Was claim consultant(s) heavily involved in the dispute resolution process (client)?

(No - Yes) 1 2 3 4 5 6

37. Alternative dispute resolution:
How well did the contract spell out the use of alternative dispute resolution techniques to resolve contractual disputes?

(Good - Poor) 1 2 3 4 5 6

38. Element of trust:
What was the level of trust between the two organisations or the dispute resolution teams?

(Good - Poor) 1 2 3 4 5 6

39. Motivation to settle (contractor):
Did the contractor have direct, tangible, personal incentives to resolve dispute?

(Yes - No) 1 2 3 4 5 6

40. Motivation to settle (client):
Did the client have direct, tangible personal incentive to resolve the dispute?

(Yes - No) 1 2 3 4 5 6

41. Negotiation skills (contractor):
How would you classify the contractor's negotiation skill?

(Good - Bad) 1 2 3 4 5 6

42. Negotiation skills (client):
How would you classify the client's negotiation skill?

(Good - Bad) 1 2 3 4 5 6

43. Expectation of future work (contractor):
To what extent did the success of resolving disputes of this project affect the possibility of future work from the same client?

(High - Low) 1 2 3 4 5 6

44. Expectation of future work (client):
To what extent did the success of resolving disputes of this project affect the possibility of future work requiring th contractor's expertise?

(High - Low) 1 2 3 4 5 6

End of Questionnaire
Thank you!

Appendix B
Interviews Reports of Pilot Study for Questionnaire Design

Pilot Study : A Model for Predicting Client's Dispute Resolution Satisfaction

Interview Reports

I) Interviewee: Mr. Lewis Chung 21/11/96

(Building Services Contract Engineer MTRC Corporation)

Do Clients use dispute resolution as a measure of project satisfaction?

It is certainly a concern to a client like WTRC otherwise MTRC would not put in so much effort to improve the contract administration process to ensure no arbitration proceeding.

What is the general attitude of clients towards resolving disputes?

My experience with clients while I am working in cost consultant office gives me the impression that clients find claims repulsive and consider that contractors make use of claims to recapture their loss. Most claims are without proper justification. In the case of MTRC, a more positive attitude is taken. It is believed that all dispute should be settled by project personnel on site. Regular review by senior management is installed to avoid the dispute being unattended.

Given a dispute situation, what factors would affect the resolution?

The factors you listed in the questionnaire are fairly comprehensive. However, here below lists some of my suggestion:

Environment specific-

Supply and Demand and availability of resources such as Finance, labour, subcontractor and expertise.

Organisation specific-

Role of construction/development division with the overall parent organisation of the contractor/developer;

Company culture and dominance of the contractor/developer in the market for the type of work.

Process specific-

Competence of the contractor/developer's project team in managing the works;
Effectiveness in communication among the project personnel at all tiers;
Quality assurance in planning, design and execution of the works;
Degree of subcontracting of the works;
Involvement of subcontractors in the dispute resolution process;
Involvement of the architect and surveyors in dispute resolution.

II) Interviewee: Miss Louise Popplewell 28/11/96
(James Roger Knowles (Hong Kong) Ltd.)

Do clients use dispute resolution as a measure of project satisfaction?
To certain degree, Yes.
Usually, if the disputes are resolved, then considered satisfied.

What is the general attitude of clients towards resolving disputes?
Employers: No dispute is preferred by employers. It can be said that if dispute goes beyond engineer's decision, then dispute resolution satisfaction can be classified as bad.

Given a dispute situation, what factors would affect the resolution?
1. Relationship between site project personnel.
2. Personality of the people involved in the dispute resolution process.
3. Perception/opinion about the other parties.
4. Involvement of senior management in negotiation may help.
5. A lengthy process may deter contractor to pursue.
6. Dispute with Government usually has higher chance of going full process of dispute resolution.

III) Interviewee: Mr. Gerard Muldoon 11/12/96
(Dragages et Travaux Publics (HK) Ltd)

Do client use dispute resolution as a measure of project satisfaction?

Suppose so, but certainly not take priority over time, cost and quality.

What is the general attitude of clients towards resolving dispute?

Clients dislike dispute however, the strict procedural requirement in the contract in actual fact invite dispute.

Given a dispute resolution, what factors would affect the resolution?

Most importantly, is there a common goal for the two parties.

Secondly, the consultants (often cause the problem) however do not hold responsibility, usually obstruct resolution. Dispute should be resolved between the parties to the contract.

What factors would prompt a dispute to be escalated to formal dispute resolution process?

It is difficult to say, more often than not, it is because one party deliberately escalate the dispute and invoke arbitration as either a delaying tactic.

Comments on the questionnaire.

General:--- Who will fill the questionnaire?

Q11 Work Load (Hong Kong or world wide)
Difficult to have figure in total asset.

Q12 Extremely difficult to obtain total profit/total asset.

Q13. Meaning of claim consciousness? any other way to define?

Q18 Extremely difficult to ask for estimate / tender sum

Q23 % may be possible instead of actual numerical value.

Q26 Clarity of document?

It may be necessary to ask an additional question : does the party(ies) actually perform their contract as per their interpretation.

IV) Interviewee : Mr Alan Donnet 20/12/96

Contract Administration Manager MTRC

Dispute Resolution as a measure of satisfaction?

MTRC treats dispute resolution an important facet of project management.

So, there has never been an arbitration proceeding.

It is the belief of the corporation that ' there is no area of dispute that cannot be resolved by negotiation'.

MTRC will take a commercial approach to any dispute that has arisen.

This company philosophy can be reflected in the MTRC contract provision for settlement of dispute:

* There is no sequential dispute resolution procedure (a stepping up one as in the ACP form, a stepping up procedure annotate an escalation).

* Arbitration is the sole method for resolving dispute (refers to attached settlement of dispute provision under the MTRC contract).

The rationale behind this arrangement is to deter superfluous claims. If the contractor is to dispute an engineer's decision and would like to purse it further, then he would have to issue a notice of dispute.

Also, the corporate has faith in their engineer's decisions.

Arbitration will have to be opened after practical completion.

Factors to dispute and factors that escalate a dispute to proceed to arbitration?

It would appear that the root clause to contractual disputes are commercial aspects i.e. the money at stake. Generally, it can be described as the expectation of the contract is greater than the engineer's assessment.

The driving force therefore about the commercial aspects. Sometimes personality may come into picture.

Most of the time, it is the result of under-pricing, or risk not adequately priced.

It is possible to distinguish the resolution process into the negotiation stage and the formal resolution procedure. During the negotiation stage, commercial aspects prevails.

However, if and formal procedure is instigated, then the dispute specific considerations will be more critical.

Appendix C
Data Collection Questionnaire

Construction Dispute Resolution: Data Collection Survey

This survey is part of a PhD research programme registered at University of Wolverhampton, United kingdom. The research seeks to investigate the relationship between project variables and dispute resolution. The data collected will be solely used for the aforementioned research purpose and will be treated in the strictest confidence. Thank you for your support to this research.

Directions:

This survey packet collects information in relation to completed construction projects. Please complete a separate packet for EACH project to be surveyed. The project should have no outstanding unsettled disputes (not necessary if the project already had arbitration proceedings held or in progress). Each packet would take approximately 30 minutes to answer. The survey contains 37 questions divided into 4 sections.

Section One:	Project background data.
Section Two:	Organisation specific data.
Section Three:	Project specific data.
Section Four:	Resolution process specific data.

In some of the questions, a rating assessment is required, a sacle of 1 to 6 is to be applied in such cases.

Definitions:

Disputes:
Matters over which the decision of the contract administrator is disagreed by either or both parties.

Dispute Resolution Satisfaction:
A general feeling of the client's satisfaction in relation to the process of dispute resolution.

Alternative Dispute Resolution processes:
These include conciliation, mediation, minitrial and the like (Negotiation, arbitration and litigation do not belong to the class of alternative dispute resolution process).

Section One - Project background data:

1. Title of Project:

____

2. Name of Contractor:

____

3. Name of Client:

____

4. The period during which the project was constructed:

   Project duration ______ (months) Period:

____

5. What was the type of project for which this survey was completed?

Public housing	1
Residential	2
Industrial	3
Commercial	4
Civil Engineering	5
Others please specify	________

6. What role did the contractor play in this project?

General contractor	1
Design and Build contractor	2
Construction Manager	3
Build, operate and transfer	4
Others please specify	________

7. The contract value (HK$) of the project was:

<10	mill	1
10 - 50	mill	2
50 - 100	mill	3
100 - 200	mill	4
200 - 500	mill	5
over 500	mill	6

8. What was the general payment method used by this project?

Monthly progress payments	1
Stage payments	2
Milestone payments	3
Lump sum payment on completion	4
Others please specify	______________

9. What was the conditions of contract used ?

The Standard form of Building Contracts (HKIA) form		1
Hong Kong Government form		2
Hong Kong Government Airport Core Program form		3
Other standard forms	______________________	4
Specially drafted for the project		5
Others please specify	______________________	6

10. Consider the largest dispute, at what stage was the dispute resolved or settled?

No argument over the decision of the contract administrator		1
Negotiation between project personnel		2
Alternatives dispute resolution processes		3
Negotiation after notice of arbitration served		4
Arbitration		5
Litigation		6
Others please specify	______________________	7

11. Generally, how you would describe the satisfaction of the client in connection with how the dispute was resolved?

Satisfied	1
Not satisfied	2

<u>**Section Two - Organisation specific data:**</u>

12. Client's experience with the type of construction:
Number of similar projects in the last three years

____

13. Client's budget constraint for this project:

The ratio: Estimate / Accepted Tender Price = __________

14. The origin of the organisation:

	Client	Contractor
Japanese	1	1
Korean	2	2
Chinese	3	3
Hong Kong	4	4
Western	5	5
Others ________	6	________ 6

15. Previous working relationship between the client and the contractor in the last three years (measured by number of projects):

____

16. Contractor's experience with the type of construction: Number of similar projects in the last three years

____

17. Contractor's workload in the local market (during the project duration):
__________% of capacity in operation

18. Contractor's claim consciousness:

Number of variation instructions ____________
Number of claim notification ____________
Number of actual submission ____________

<u>**Section Three - Project specific data:**</u>

19. Contractor's selection criteria employed by client: (Technical consideration - price only) 1 2 3 4 5 6

20. Tendering process:

Open tender	1
Invited tender	2
Pre-qualification	3
Negotiated (without other tenderers)	4
Others ____________________	5

21. Design complexity of the project:
(Low - High) 1 2 3 4 5 6

22. Construction complexity of the project:
(Low - High) 1 2 3 4 5 6

23. Degree of nomination (% by contract value):
Total of all nominated subcontracts final contract sum /
Final account figure
________________%

24. Was the work scope clearly defined and spelt out by the contract documents?
(Yes - No) 1 2 3 4 5 6

25. Was risk allocation of the project fair and equitable?
(Yes - No) 1 2 3 4 5 6

26. Design Changes:
The ratio: Total of the Variations Bill + Claims /
The Final Account figure

____

27. Relationship between project personnel:
(Good - Bad) 1 2 3 4 5 6

28. Client's involvement in the running of the project:

No involvement	1
Own representative attending meetings at regular intervals	2
Own representative attending all meetings	3
Full time project manager directly employed by client	4
In house design and contract administration teams	5
Others please specify ______________________________	6

Section Four - Resolution process specific data:

29. How well did the contract spell out the use of alternative dispute resolution processes to resolve contractual disputes?
(Good - Poor) 1 2 3 4 5 6

30. How would you classify the negotiation skill of the team?

Client	(Good - Bad)	1 2 3 4 5 6
Contractor	(Good - Bad)	1 2 3 4 5 6

31. Was the senior management heavily involved in the dispute resolution process?

Client	(Yes - No)	1 2 3 4 5 6
Contractor	(Yes - No)	1 2 3 4 5 6

32. Was external claim adviser(s) heavily involved in the dispute resolution process?

Client	(No - Yes)	1 2 3 4 5 6
Contractor	(No - Yes)	1 2 3 4 5 6

33. Did the disputants have direct, tangible, personal incentives to resolve the dispute?

Client	(Yes - No)	1 2 3 4 5 6
Contractor	(Yes - No)	1 2 3 4 5 6

34. To what extent did the success of resolving disputes of this project affect the possibility of future work requiring the contractor's expertise?
(High - Low) 1 2 3 4 5 6

35. To what extent did the success of resolving disputes of this project affect the possibility of future work from the same client?
(High - Low) 1 2 3 4 5 6

36. What was the level of trust between the two dispute resolution team?
(Good - Poor) 1 2 3 4 5 6

37. Did the client and the contractor have equivalent abilities and resources to absorb costs associated with protracted resolution process?
(Yes - No) 1 2 3 4 5 6

End of Questionnaire

Thank you for your support to this research!

Appendix D
Data Base for Environment Specific Variables

Data Base for Environmental Specific variables:

Source: 1. Hong Kong Monthly Digest of Statistics (Hong Kong Government)
2. Tender Price Index (Architectural Services Department)

Five types of data are presented hereunder:

Period	CPI(A)		Tender Price Index for Quarter (ASD)	Best Lending Rate (% p.a.)	Consent to commence Work ('000 m^2)	Gross Value of Construction Works for Quarter (HK$ Mill)
Jan 80	150		347	14.5	454	
Feb 80	158			14.5	295	
Mar 80	158			16	152	
Apr 80	156		353	16	188	
May 80	157			14.5	221	
June 80	158			12.5	199	
July 80	163		369	10	214	
Aug 80	164			10	233	
Sept 80	165	100		10.5	265	
Oct 80	165		381	12	108	
Nov 80	167	107		14	239	
Dec 80	168	108		17	294	
Jan 81	171	110	389	17	795	
Feb 81	176	112		17	267	
Mar 81	178	113		17	153	
Apr 81	179	114	393	17	264	
May 81	181	116		17	309	
June 81	184	117		17	391	
July 81	188	119	375	18	182	
Aug 81	192	121		18	441	
Sept 81	192	121		18	265	
Oct 81	198	124	376	20	413	
Nov 81	195	124		18	351	
Dec 81		123		16	315	
Jan 82		125	364	16	228	
Feb 82		127		16	222	
Mar 82		127		16	356	
Apr 82		127	370	16	599	
May 82		129		15	281	
June 82		130		15	262	
July 82		131	342	14	216	
Aug 82		132		12.5	319	
Sept 82		132		12	183	

Period	CPI(A)		Tender Price Index for Quarter (ASD)	Best Lending Rate (% p.a.)	Consent to commence Work ('000 m^2)	Gross Value of Construction Works for Quarter (HK$ Mill)
Oct 82		134	327	12	132	
Nov 82		134		11	224	
Dec 82		135		10.5	122	
Jan 83		135	298	10.5	98	8,751
Feb 83		138		10.5	82	
Mar 83		140		10.5	181	
Apr 83		142	298	11.5	265	8,703
May 83		140		13.5	151	
June 83		142		13.5	107	
July 83		142	317	12	176	8,573
Aug 83		143		11.5	183	
Sept 83		146		14	186	
Oct 83		151	326	15	327	9,513
Nov 83		150		13.5	307	
Dec 83		150		12	123	
Jan 84		151.6	328	11.5	186	8,845
Feb 84		153.6		10	224	
Mar 84		152.9		9	212	
Apr 84		153.9	332	11	136	8,810
May 84		154.1		12	248	
June 84		155.5		13.5	200	
July 84		155.6	323	17	207	9,141
Aug 84		155.7		15	96	
Sept 84		156.9		14	209	
Oct 84		156	337	12.5	139	9,511
Nov 84		156.2		11.5	171	
Dec 84		156.7		11	196	
Jan 85		156.5	326	10.5	246	9,355
Feb 85		157.9		10	98	
Mar 85		159.3		10	225	
Apr 85		159.9	335	10	156	9,396
May 85		159		9	158	
June 85		159.8		8.5	117	
July 85		159.6	344	7	290	9,012
Aug 85		159.9		6	319	
Sept 85	100	162.8		7	161	
Oct 85	101.1	161.1	351	7	308	9,911
Nov 85	101.2	160.7		7	245	
Dec 85	101.3	160.8		7	270	
Jan 86	101.3	160.7	376	7	343	9,323

Period	CPI(A)		Tender Price Index for Quarter (ASD)	Best Lending Rate (% p.a.)	Consent to commence Work ('000 m²)	Gross Value of Construction Works for Quarter (HK$ Mill)
Feb 86	102.6	162.9		7	124	
Mar 86	102.4	162.9		7	258	
Apr 86	103	163.3	392	8	288	9,426
May 86	102.9	163.1		7.5	249	
June 86	103.8	164.3		7.5	209	
July 86	104.4	165.1	373	7.5	231	10,181
Aug 86	103.9	164.5		6.5	299	
Sept 86	104.6	165.3		6.5	239	
Oct 86	104.8	165.8	380	6.5	399	11,208
Nov 86	105	166.5		6.5	405	
Dec 86	105.1			6.5	352	
Jan 87	105.8		385	5	178	11,776
Feb 87	106.6			5	206	
Mar 87	106.9			6	272	
Apr 87	108.1		403	6.5	441	11,941
May 87	108.4			6.5	330	
June 87	109.8			7	344	
July 87	109.3		411	7	243	8,261
Aug 87	110.4			7	295	
Sept 87	110.8			7.5	320	
Oct 87	111.5		438	7.5	400	9,511
Nov 87	111.6			6.5	445	
Dec 87	113			5.5	225	
Jan 88	112.5		479	5.25	260	9,541
Feb 88	114			6	199	
Mar 88	114.5			6	208	
Apr 88	116.1		510	6.5	407	9,900
May 88	116.1			7.5	277	
June 88	117			8	297	
July 88	118		521	9	516	9,586
Aug 88	118.9			9.5	308	
Sept 88	120.5			9.5	209	
Oct 88	120		541	9.5	193	11,848
Nov 88	121.1			9.5	191	
Dec 88	121.7			10	150	
Jan 89	123.1		542	10	258	11,868
Feb 89	125.9			10.5	246	
Mar 89	125.4			11	270	
Apr 89	127.3		548	11.5	341	11,922
May 89	128.4			11.5	221	

Period	CPI(A)		Tender Price Index for Quarter (ASD)	Best Lending Rate (% p.a.)	Consent to commence Work ('000 m^2)	Gross Value of Construction Works for Quarter (HK$ Mill)
June 89	129.9			11	190	
July 89	130.2		552	10.5	205	12,667
Aug 89	130.7			10	199	
Sept 89	132.6			10	262	
Oct 89	132.6		559	10	231	13,453
Nov 89	132.7			10	265	
Dec 89	133.5			10	610	
Jan 90	135.2		574	10	223	13,795
Feb 90	136.5			10	291	
Mar 90	137.9			10	355	
Apr 90	139.3		561	11	270	14,891
May 90	140.3			11	257	-
June 90	141.7			11	337	
July 90	142.4		582	11	679	15,793
Aug 90	142.9			10.5	378	—
Sept 90	145.5	100		10.5	222	
Oct 90	146.4	105.8	596	10	355	16,858
Nov 90	147.2	106.5		10	288	
Dec 90	148.6	107.4		10	180	
Jan 91	149.8	108.3	608	10	260	15,633
Feb 91	152.7	110.3		9.5	122	
Mar 91	155.8	111.9		9.5	481	
Apr 91	158.7	113.9	592	9.5	364	15,784
May 91	158.7	114		9.5	311	
June 91	159.2	114.6		10.5	180	
July 91	160.4	115.4	573	9.5	336	15,721
Aug 91	161.1	116		9.5	312	
Sept 91	162.3	116.8		9	270	
Oct 91	162.9	117.2	515	9	380	16,892
Nov 91	163.5	117.7		8.5	242	
Dec 91		118.1		8.5	306	
Jan 92		119.7	531	8.5	162	16,132
Feb 92		121.8		8.5	179	
Mar 92		122.5		8.5	171	
Apr 92		124	548	8.5	330	16,301
May 92		124		8	165	
June 92		125.3		7	320	
July 92		125.5	519	6.5	271	16,939
Aug 92		125.6		6.5	310	
Sept 92		128.3		6.5	245	

Period	CPI(A)		Tender Price Index (ASD)	Best Lending Rate (% p.a.)	Consent to commence work ('000 m^2)	Gross Value of Construction Works (HK$ Mill)
Oct 92		128.4	518	6.5	192	18,368
Nov 92		128.5		6.5	374	
Dec 92		129.3		6.5	248	
Jan 93		131.8	527	6.5	122	17,024
Feb 93		132.4		6.5	95	
Mar 93		132		6.5	317	
Apr 93		133.5	527	6.5	177	18,105
May 93		134.5		6.5	268	
June 93		136		6.5	150	
July 93		135.8	541	6.5	335	19,176
Aug 93		136.3		6.5	51	
Sept 93		138.4		6.5	40	
Oct 93		140	563	6.5	279	21,033
Nov 93		139.4		6.5	307	
Dec 93		140.4		6.5	118	-
Jan 94		140	586	6.5	185	21,635
Feb 94		142.7		6.5	172	
Mar 94		142.5		6.5	243	
Apr 94		143.8	594	6.75	117	22,084
May 94		145		7.25	220	
June 94		146.2		7.25	234	
July 94		147.3	615	7.25	264	21,872
Aug 94		149.6		7.75	139	
Sept 94		150.3		7.75	167	
Oct 94		151.1	666	7.75	104	23,582
Nov 94		151.4		8.5	194	
Dec 94		153		8.5	77	
Jan 95		154.1	708	8.5	152	22,835
Feb 95		155.4		9	168	
Mar 95		156.1		9	199	
Apr 95		157.6	712	9	254	24,518
May 95		158.1		9	197	
June 95		159.2		9	145	
July 95		159.8	733	9	106	24,686
Aug 95		162		9	107	
Sept 95	100	163.7		9	19	
Oct 95	104.3	163.8	747	9	281	27,769
Nov 95	104.3	163.8		9	279	
Dec 95	103.9	163.1		9	129	
Jan 96	104.1	163.2	772	8.75	154	27,504

Period	CPI(A)		Tender Price Index for Quarter (ASD)	Best Lending Rate (% p.a.)	Consent to commence Work ('000 m^2)	Gross Value of Construction Works for Quarter (HK$ Mill)
Feb 96	105.4	165.6		8.5	183	
Mar 96	106.1	166.5		8.5	128	
Apr 96	107.3	168.4	813	8.5	183	27,556
May 96	107.1	168.1		8.5	296	
June 96	107.8	169.2		8.5	137	
July 96	108	169.7	848	8.5	570	27,012
Aug 96	108.2	169.7		8.5	74	
Sept 96	109.6	171.9		8.5	459	
Oct 96	109.9	172.3	885	8.5	328	31,965
Nov 96	110.3	172.8		8.5	364	
Dec 96	110.9	173.7		8.5	306	
Jan 97	110.9	173.7		8.5	217	
Feb 97	112.3	175.9		8.5		
Mar 97				8.5		
Apr 97				8.75		

Appendix E
Correlation Matrix of the Variables

- - Correlation Coefficients - -

	E_INFL	E_INTRAT	E_TENIN	E_WKLD1	E_WKLD2	O_BUDGET
E_INFL	1.0000 (48) P= .	-.0763 (48) P= .606	.0106 (48) P= .943	-.2548 (48) P= .081	-.1054 (48) P= .476	.0276 (48) P= .852
E_INTRAT	-.0763 (48) P= .606	1.0000 (48) P= .	.1142 (48) P= .440	.0429 (48) P= .772	.0028 (48) P= .985	-.1261 (48) P= .393
E_TENIN	.0106 (48) P= .943	.1142 (48) P= .440	1.0000 (48) P= .	-.5349 (48) P= .000	.6851 (48) P= .000	.0624 (48) P= .674
E_WKLD1	-.2548 (48) P= .081	.0429 (48) P= .772	-.5349 (48) P= .000	1.0000 (48) P= .	-.5148 (48) P= .000	-.1745 (48) P= .235
E_WKLD2	-.1054 (48) P= .476	.0028 (48) P= .985	.6851 (48) P= .000	-.5148 (48) P= .000	1.0000 (48) P= .	.1635 (48) P= .267
O_BUDGET	.0276 (48) P= .852	-.1261 (48) P= .393	.0624 (48) P= .674	-.1745 (48) P= .235	.1635 (48) P= .267	1.0000 (48) P= .
O_C_CLAM	.0819 (48) P= .580	.0976 (48) P= .509	.0595 (48) P= .688	.0338 (48) P= .820	.0532 (48) P= .720	.3289 (48) P= .022
O_CAP_CO	.0524 (48) P= .724	.1487 (48) P= .313	.0843 (48) P= .569	-.0644 (48) P= .664	.0647 (48) P= .662	-.0702 (48) P= .635
O_CLEXP	.1356 (48) P= .358	.0361 (48) P= .807	-.0418 (48) P= .778	-.0659 (48) P= .656	.0182 (48) P= .902	-.3014 (48) P= .037
O_COEXP	.0405 (48) P= .785	.0040 (48) P= .979	.2065 (48) P= .159	-.1714 (48) P= .244	.2079 (48) P= .156	-.2458 (48) P= .092
O_ORG_CL	.1920 (48) P= .191	.0368 (48) P= .804	-.0203 (48) P= .891	-.2961 (48) P= .041	.0341 (48) P= .818	-.2136 (48) P= .145

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	E_INFL	E_INTRAT	E_TENIN	E_WKLD1	E_WKLD2	O_BUDGET
O_ORG_CO	.1723 (48) P= .242	.0009 (48) P= .995	-.0088 (48) P= .953	.0353 (48) P= .812	.0300 (48) P= .839	-.0985 (48) P= .505
O_PRWKRE	.2199 (48) P= .133	.0709 (48) P= .632	.1032 (48) P= .485	-.2295 (48) P= .117	.2096 (48) P= .153	-.1692 (48) P= .250
P_CONCOM	-.1622 (48) P= .271	.1308 (48) P= .375	-.1812 (48) P= .218	.1545 (48) P= .294	-.0937 (48) P= .526	.1355 (48) P= .358
P_DESCH	-.2559 (48) P= .079	.0748 (48) P= .613	-.0791 (48) P= .593	.6321 (48) P= .000	-.2463 (48) P= .092	-.0856 (48) P= .563
P_DESCOM	-.3225 (48) P= .025	.1990 (48) P= .175	-.1533 (48) P= .298	.1347 (48) P= .361	-.1465 (48) P= .320	.1137 (48) P= .442
P_INV_CL	.1544 (48) P= .295	.0209 (48) P= .888	.1485 (48) P= .314	-.1767 (48) P= .230	.2238 (48) P= .126	.2427 (48) P= .096
P_NOMIN	-.0038 (48) P= .979	-.0569 (48) P= .701	-.1711 (48) P= .245	-.0392 (48) P= .791	.0094 (48) P= .950	-.2353 (48) P= .107
P_REL	-.1998 (48) P= .173	.1734 (48) P= .239	-.1528 (48) P= .300	.1192 (48) P= .420	-.3594 (48) P= .012	.0292 (48) P= .844
P_RISKAL	.2489 (48) P= .088	-.0720 (48) P= .627	-.1089 (48) P= .461	-.2117 (48) P= .149	.0774 (48) P= .601	-.1713 (48) P= .244
P_SELCRI	-.0016 (48) P= .991	-.1450 (48) P= .325	-.2797 (48) P= .054	.2674 (48) P= .066	-.2658 (48) P= .068	.0948 (48) P= .522
P_TENPRO	-.0682 (48) P= .645	.0759 (48) P= .608	.1843 (48) P= .210	-.2471 (48) P= .090	.3982 (48) P= .005	-.1131 (48) P= .444

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	E_INFL	E_INTRAT	E_TENIN	E_WKLD1	E_WKLD2	O_BUDGET
P_WKSCOP	.0178	-.0272	-.1991	-.0817	-.2666	-.1506
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .905	P= .854	P= .175	P= .581	P= .067	P= .307
R_ADR	-.1990	-.0172	.1073	.1411	-.0305	.2264
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .175	P= .907	P= .468	P= .339	P= .837	P= .122
R_ADV_CL	-.1438	.0920	-.1439	.2623	-.0816	-.0135
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .330	P= .534	P= .329	P= .072	P= .582	P= .928
R_ADV_CO	-.0591	-.1213	-.3369	.2952	-.4291	-.1682
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .690	P= .411	P= .019	P= .042	P= .002	P= .253
R_EQUAB	.0797	-.1315	-.0710	-.0105	.0066	-.0381
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .590	P= .373	P= .631	P= .944	P= .964	P= .797
R_FUT_CL	-.1570	.0161	.0481	.2710	-.1162	.1138
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .287	P= .914	P= .746	P= .062	P= .432	P= .441
R_FUT_CO	-.2765	-.0147	-.2158	.3957	-.2843	.1359
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .057	P= .921	P= .141	P= .005	P= .050	P= .357
R_INC_CL	-.4167	-.2170	-.1131	.2321	-.1728	-.0714
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .003	P= .138	P= .444	P= .112	P= .240	P= .630
R_INC_CO	-.3727	.1902	-.1474	.4153	-.1401	.1796
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .009	P= .195	P= .317	P= .003	P= .342	P= .222
R_MAN_CL	.1425	-.1022	-.1300	.1237	-.1785	.1308
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .334	P= .490	P= .378	P= .402	P= .225	P= .375
R_MAN_CO	-.1613	.1933	.0563	-.0906	.0625	.0237
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .273	P= .188	P= .704	P= .540	P= .673	P= .873

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	E_INFL	E_INTRAT	E_TENIN	E_WKLD1	E_WKLD2	O_BUDGET
R_NEG_CL	-.1260	-.0901	-.0701	.1174	-.2134	.1546
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .393	P= .543	P= .636	P= .427	P= .145	P= .294
R_NEG_CO	-.1454	.1612	.1075	.0243	-.1924	.0673
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .324	P= .274	P= .467	P= .870	P= .190	P= .650
R_TRUST	-.2863	.0805	-.0411	.1083	-.2448	.0355
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .048	P= .587	P= .782	P= .464	P= .094	P= .811

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	O_C_CLAM	O_CAP_CO	O_CLEXP	O_COEXP	O_ORG_CL	O_ORG_CO
E_INFL	.0819 (48) P= .580	.0524 (48) P= .724	.1356 (48) P= .358	.0405 (48) P= .785	.1920 (48) P= .191	.1723 (48) P= .242
E_INTRAT	.0976 (48) P= .509	.1487 (48) P= .313	.0361 (48) P= .807	.0040 (48) P= .979	.0368 (48) P= .804	.0009 (48) P= .995
E_TENIN	.0595 (48) P= .688	.0843 (48) P= .569	-.0418 (48) P= .778	.2065 (48) P= .159	-.0203 (48) P= .891	-.0088 (48) P= .953
E_WKLD1	.0338 (48) P= .820	-.0644 (48) P= .664	-.0659 (48) P= .656	-.1714 (48) P= .244	-.2961 (48) P= .041	.0353 (48) P= .812
E_WKLD2	.0532 (48) P= .720	.0647 (48) P= .662	.0182 (48) P= .902	.2079 (48) P= .156	.0341 (48) P= .818	.0300 (48) P= .839
O_BUDGET	.3289 (48) P= .022	-.0702 (48) P= .635	-.3014 (48) P= .037	-.2458 (48) P= .092	-.2136 (48) P= .145	-.0985 (48) P= .505
O_C_CLAM	1.0000 (48) P= .	.1064 (48) P= .472	-.1199 (48) P= .417	-.0687 (48) P= .643	-.0342 (48) P= .818	-.3669 (48) P= .010
O_CAP_CO	.1064 (48) P= .472	1.0000 (48) P= .	.3486 (48) P= .015	-.0645 (48) P= .663	.2181 (48) P= .136	.0742 (48) P= .616
O_CLEXP	-.1199 (48) P= .417	.3486 (48) P= .015	1.0000 (48) P= .	.1643 (48) P= .265	.4409 (48) P= .002	.1879 (48) P= .201
O_COEXP	-.0687 (48) P= .643	-.0645 (48) P= .663	.1643 (48) P= .265	1.0000 (48) P= .	.1699 (48) P= .248	.0098 (48) P= .948
O_ORG_CL	-.0342 (48) P= .818	.2181 (48) P= .136	.4409 (48) P= .002	.1699 (48) P= .248	1.0000 (48) P= .	.0228 (48) P= .878

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	O_C_CLAM	O_CAP_CO	O_CLEXP	O_COEXP	O_ORG_CL	O_ORG_CO
O_ORG_CO	-.3669 (48) P= .010	.0742 (48) P= .616	.1879 (48) P= .201	.0098 (48) P= .948	.0228 (48) P= .878	1.0000 (48) P= .
O_PRWKRE	-.0365 (48) P= .806	.1808 (48) P= .219	.2065 (48) P= .159	.3687 (48) P= .010	.4078 (48) P= .004	.2725 (48) P= .061
P_CONCOM	-.0306 (48) P= .837	-.1668 (48) P= .257	-.2140 (48) P= .144	.0878 (48) P= .553	-.1144 (48) P= .439	.0155 (48) P= .917
P_DESCH	.1761 (48) P= .231	-.0144 (48) P= .923	-.2153 (48) P= .142	-.1945 (48) P= .185	-.2808 (48) P= .053	.1105 (48) P= .455
P_DESCOM	-.0221 (48) P= .881	-.1948 (48) P= .185	-.2613 (48) P= .073	-.0419 (48) P= .777	-.1675 (48) P= .255	-.0754 (48) P= .610
P_INV_CL	.1677 (48) P= .254	.2764 (48) P= .057	.2647 (48) P= .069	-.2196 (48) P= .134	.3388 (48) P= .019	.2535 (48) P= .082
P_NOMIN	-.1592 (48) P= .280	-.3583 (48) P= .012	-.0296 (48) P= .842	.2106 (48) P= .151	.2736 (48) P= .060	-.0242 (48) P= .870
P_REL	-.0667 (48) P= .653	-.2609 (48) P= .073	-.1502 (48) P= .308	.0351 (48) P= .813	-.1925 (48) P= .190	-.1434 (48) P= .331
P_RISKAL	-.0585 (48) P= .693	.1107 (48) P= .454	.3155 (48) P= .029	.0711 (48) P= .631	.6538 (48) P= .000	.1850 (48) P= .208
P_SELCRI	.0301 (48) P= .839	.0077 (48) P= .959	.2854 (48) P= .049	-.2798 (48) P= .054	-.0179 (48) P= .904	-.2425 (48) P= .097
P_TENPRO	.0961 (48) P= .516	.0417 (48) P= .779	-.0653 (48) P= .659	.1196 (48) P= .418	.1577 (48) P= .285	-.0528 (48) P= .722

(Coefficient / (Cases) / 2-tailed Significance)

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- - Correlation Coefficients - -

	O_C_CLAM	O_CAP_CO	O_CLEXP	O_COEXP	O_ORG_CL	O_ORG_CO
P_WKSCOP	-.0330 (48) P= .824	-.2988 (48) P= .039	-.2121 (48) P= .148	.1254 (48) P= .396	.1887 (48) P= .199	-.1257 (48) P= .395
R_ADR	-.0798 (48) P= .590	.0743 (48) P= .616	-.0417 (48) P= .778	-.1898 (48) P= .196	-.5430 (48) P= .000	.1573 (48) P= .286
R_ADV_CL	.0296 (48) P= .841	-.2396 (48) P= .101	-.1893 (48) P= .197	-.1267 (48) P= .391	-.2152 (48) P= .142	.0335 (48) P= .821
R_ADV_CO	.1656 (48) P= .261	.0254 (48) P= .864	-.0009 (48) P= .995	-.0077 (48) P= .959	-.2291 (48) P= .117	-.1791 (48) P= .223
R_EQUAB	-.0487 (48) P= .742	-.1354 (48) P= .359	.0867 (48) P= .558	-.0177 (48) P= .905	-.0782 (48) P= .597	.1254 (48) P= .396
R_FUT_CL	.1226 (48) P= .407	.1745 (48) P= .236	.0122 (48) P= .934	-.0766 (48) P= .605	-.3989 (48) P= .005	.0275 (48) P= .853
R_FUT_CO	.0924 (48) P= .532	.1206 (48) P= .414	-.1597 (48) P= .278	-.0760 (48) P= .607	-.3491 (48) P= .015	-.1062 (48) P= .473
R_INC_CL	-.0699 (48) P= .637	.0363 (48) P= .806	-.2108 (48) P= .150	.0878 (48) P= .553	-.3675 (48) P= .010	-.1334 (48) P= .366
R_INC_CO	-.0139 (48) P= .925	-.0482 (48) P= .745	-.2298 (48) P= .116	.0189 (48) P= .898	-.3374 (48) P= .019	-.0521 (48) P= .725
R_MAN_CL	.1697 (48) P= .249	-.1651 (48) P= .262	-.2476 (48) P= .090	.0007 (48) P= .996	-.4037 (48) P= .004	-.1020 (48) P= .490
R_MAN_CO	-.0514 (48) P= .729	-.0015 (48) P= .992	.0016 (48) P= .991	.0089 (48) P= .952	.0446 (48) P= .763	.1864 (48) P= .205

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	O_C_CLAM	O_CAP_CO	O_CLEXP	O_COEXP	O_ORG_CL	O_ORG_CO
R_NEG_CL	.0201 (48) P= .892	-.2642 (48) P= .070	-.0698 (48) P= .637	.2399 (48) P= .101	-.2721 (48) P= .061	-.1434 (48) P= .331
R_NEG_CO	.0503 (48) P= .734	-.2719 (48) P= .062	-.1417 (48) P= .337	.0356 (48) P= .810	-.1697 (48) P= .249	-.1223 (48) P= .408
R_TRUST	-.1841 (48) P= .210	-.3902 (48) P= .006	-.0031 (48) P= .983	-.0200 (48) P= .893	-.2251 (48) P= .124	-.0170 (48) P= .909

(Coefficient / (Cases) / 2-tailed Significance)

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- - Correlation Coefficients - -

	O_PRWKRE	P_CONCOM	P_DESCH	P_DESCOM	P_INV_CL	P_NOMIN
E_INFL	.2199	-.1622	-.2559	-.3225	.1544	-.0038
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .133	P= .271	P= .079	P= .025	P= .295	P= .979
E_INTRAT	.0709	.1308	.0748	.1990	.0209	-.0569
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .632	P= .375	P= .613	P= .175	P= .888	P= .701
E_TENIN	.1032	-.1812	-.0791	-.1533	.1485	-.1711
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .485	P= .218	P= .593	P= .298	P= .314	P= .245
E_WKLD1	-.2295	.1545	.6321	.1347	-.1767	-.0392
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .117	P= .294	P= .000	P= .361	P= .230	P= .791
E_WKLD2	.2096	-.0937	-.2463	-.1465	.2238	.0094
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .153	P= .526	P= .092	P= .320	P= .126	P= .950
O_BUDGET	-.1692	.1355	-.0856	.1137	.2427	-.2353
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .250	P= .358	P= .563	P= .442	P= .096	P= .107
O_C_CLAM	-.0365	-.0306	.1761	-.0221	.1677	-.1592
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .806	P= .837	P= .231	P= .881	P= .254	P= .280
O_CAP_CO	.1808	-.1668	-.0144	-.1948	.2764	-.3583
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .219	P= .257	P= .923	P= .185	P= .057	P= .012
O_CLEXP	.2065	-.2140	-.2153	-.2613	.2647	-.0296
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .159	P= .144	P= .142	P= .073	P= .069	P= .842
O_COEXP	.3687	.0878	-.1945	-.0419	-.2196	.2106
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .010	P= .553	P= .185	P= .777	P= .134	P= .151
O_ORG_CL	.4078	-.1144	-.2808	-.1675	.3388	.2736
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .004	P= .439	P= .053	P= .255	P= .019	P= .060

(Coefficient / (Cases) / 2-tailed Significance)

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- - Correlation Coefficients - -

	O_PRWKRE	P_CONCOM	P_DESCH	P_DESCOM	P_INV_CL	P_NOMIN
O_ORG_CO	.2725	.0155	.1105	-.0754	.2535	-.0242
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .061	P= .917	P= .455	P= .610	P= .082	P= .870
O_PRWKRE	1.0000	.1061	-.0173	-.0817	.1871	.1223
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .	P= .473	P= .907	P= .581	P= .203	P= .408
P_CONCOM	.1061	1.0000	.1928	.7680	-.1416	.2725
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .473	P= .	P= .189	P= .000	P= .337	P= .061
P_DESCH	-.0173	.1928	1.0000	.0772	-.1379	-.1504
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .907	P= .189	P= .	P= .602	P= .350	P= .308
P_DESCOM	-.0817	.7680	.0772	1.0000	-.0389	.2282
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .581	P= .000	P= .602	P= .	P= .793	P= .119
P_INV_CL	.1871	-.1416	-.1379	-.0389	1.0000	-.0281
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .203	P= .337	P= .350	P= .793	P= .	P= .850
P_NOMIN	.1223	.2725	-.1504	.2282	-.0281	1.0000
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .408	P= .061	P= .308	P= .119	P= .850	P= .
P_REL	-.4168	.2749	.0966	.3961	-.2136	.1794
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .003	P= .059	P= .514	P= .005	P= .145	P= .222
P_RISKAL	.2627	-.1702	-.2739	-.1382	.4315	.1876
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .071	P= .247	P= .060	P= .349	P= .002	P= .202
P_SELCRI	-.4446	-.0420	.0182	-.0517	.0986	-.0368
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .002	P= .777	P= .902	P= .727	P= .505	P= .804
P_TENPRO	.3315	-.0332	.0553	.0177	-.0522	.1190
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .021	P= .823	P= .709	P= .905	P= .724	P= .421

(Coefficient / (Cases) / 2-tailed Significance)

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- - Correlation Coefficients - -

	O_PRWKRE	P_CONCOM	P_DESCH	P_DESCOM	P_INV_CL	P_NOMIN
P_WKSCOP	.0400	.1830	.0247	.1919	-.1352	.2178
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .787	P= .213	P= .868	P= .191	P= .360	P= .137
R_ADR	-.1646	.1080	.1152	.1247	-.1483	-.4977
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .264	P= .465	P= .436	P= .398	P= .315	P= .000
R_ADV_CL	-.2554	.1660	.2197	.1233	-.0746	-.1291
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .080	P= .259	P= .134	P= .404	P= .614	P= .382
R_ADV_CO	-.2570	.0828	.2672	.0873	-.2202	.0289
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .078	P= .576	P= .066	P= .555	P= .133	P= .845
R_EQUAB	-.2721	-.0788	-.0666	-.0702	-.2092	-.0412
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .061	P= .595	P= .653	P= .635	P= .154	P= .781
R_FUT_CL	-.2270	-.1001	.2329	-.0404	-.0126	-.4097
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .121	P= .499	P= .111	P= .785	P= .932	P= .004
R_FUT_CO	-.3086	-.0775	.2142	.0739	-.1758	-.2875
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .033	P= .600	P= .144	P= .617	P= .232	P= .048
R_INC_CL	-.2426	-.0801	.2658	-.0320	-.3453	.0354
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .097	P= .588	P= .068	P= .829	P= .016	P= .811
R_INC_CO	-.2755	.0041	.2160	.0599	-.1827	-.1383
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .058	P= .978	P= .140	P= .686	P= .214	P= .349
R_MAN_CL	-.1861	.3453	.1445	.3651	-.2174	-.1218
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .205	P= .016	P= .327	P= .011	P= .138	P= .410
R_MAN_CO	.2015	-.0363	-.1601	-.0118	-.0662	.0358
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .170	P= .806	P= .277	P= .936	P= .655	P= .809

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	O_PRWKRE	P_CONCOM	P_DESCH	P_DESCOM	P_INV_CL	P_NOMIN
R_NEG_CL	-.2787	.1397	.0578	.0924	-.2752	.1082
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .055	P= .344	P= .696	P= .532	P= .058	P= .464
R_NEG_CO	-.3986	.0136	-.0702	.1191	-.0865	.1394
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .005	P= .927	P= .636	P= .420	P= .559	P= .345
R_TRUST	-.3947	.0492	.2059	.1503	-.2904	.1627
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .005	P= .740	P= .160	P= .308	P= .045	P= .269

(Coefficient / (Cases) / 2-tailed Significance)

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- - Correlation Coefficients - -

	P_REL	P_RISKAL	P_SELCRI	P_TENPRO	P_WKSCOP	R_ADR
E_INFL	-.1998 (48) P= .173	.2489 (48) P= .088	-.0016 (48) P= .991	-.0682 (48) P= .645	.0178 (48) P= .905	-.1990 (48) P= .175
E_INTRAT	.1734 (48) P= .239	-.0720 (48) P= .627	-.1450 (48) P= .325	.0759 (48) P= .608	-.0272 (48) P= .854	-.0172 (48) P= .907
E_TENIN	-.1528 (48) P= .300	-.1089 (48) P= .461	-.2797 (48) P= .054	.1843 (48) P= .210	-.1991 (48) P= .175	.1073 (48) P= .468
E_WKLD1	.1192 (48) P= .420	-.2117 (48) P= .149	.2674 (48) P= .066	-.2471 (48) P= .090	-.0817 (48) P= .581	.1411 (48) P= .339
E_WKLD2	-.3594 (48) P= .012	.0774 (48) P= .601	-.2658 (48) P= .068	.3982 (48) P= .005	-.2666 (48) P= .067	-.0305 (48) P= .837
O_BUDGET	.0292 (48) P= .844	-.1713 (48) P= .244	.0948 (48) P= .522	-.1131 (48) P= .444	-.1506 (48) P= .307	.2264 (48) P= .122
O_C_CLAM	-.0667 (48) P= .653	-.0585 (48) P= .693	.0301 (48) P= .839	.0961 (48) P= .516	-.0330 (48) P= .824	-.0798 (48) P= .590
O_CAP_CO	-.2609 (48) P= .073	.1107 (48) P= .454	.0077 (48) P= .959	.0417 (48) P= .779	-.2988 (48) P= .039	.0743 (48) P= .616
O_CLEXP	-.1502 (48) P= .308	.3155 (48) P= .029	.2854 (48) P= .049	-.0653 (48) P= .659	-.2121 (48) P= .148	-.0417 (48) P= .778
O_COEXP	.0351 (48) P= .813	.0711 (48) P= .631	-.2798 (48) P= .054	.1196 (48) P= .418	.1254 (48) P= .396	-.1898 (48) P= .196
O_ORG_CL	-.1925 (48) P= .190	.6538 (48) P= .000	-.0179 (48) P= .904	.1577 (48) P= .285	.1887 (48) P= .199	-.5430 (48) P= .000

(Coefficient / (Cases) / 2-tailed Significance)

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- - Correlation Coefficients - -

	P_REL	P_RISKAL	P_SELCRI	P_TENPRO	P_WKSCOP	R_ADR
O_ORG_CO	-.1434 (48) P= .331	.1850 (48) P= .208	-.2425 (48) P= .097	-.0528 (48) P= .722	-.1257 (48) P= .395	.1573 (48) P= .286
O_PRWKRE	-.4168 (48) P= .003	.2627 (48) P= .071	-.4446 (48) P= .002	.3315 (48) P= .021	.0400 (48) P= .787	-.1646 (48) P= .264
P_CONCOM	.2749 (48) P= .059	-.1702 (48) P= .247	-.0420 (48) P= .777	-.0332 (48) P= .823	.1830 (48) P= .213	.1080 (48) P= .465
P_DESCH	.0966 (48) P= .514	-.2739 (48) P= .060	.0182 (48) P= .902	.0553 (48) P= .709	.0247 (48) P= .868	.1152 (48) P= .436
P_DESCOM	.3961 (48) P= .005	-.1382 (48) P= .349	-.0517 (48) P= .727	.0177 (48) P= .905	.1919 (48) P= .191	.1247 (48) P= .398
P_INV_CL	-.2136 (48) P= .145	.4315 (48) P= .002	.0986 (48) P= .505	-.0522 (48) P= .724	-.1352 (48) P= .360	-.1483 (48) P= .315
P_NOMIN	.1794 (48) P= .222	.1876 (48) P= .202	-.0368 (48) P= .804	.1190 (48) P= .421	.2178 (48) P= .137	-.4977 (48) P= .000
P_REL	1.0000 (48) P= .	-.0649 (48) P= .661	.0851 (48) P= .565	-.1498 (48) P= .310	.5357 (48) P= .000	.0205 (48) P= .890
P_RISKAL	-.0649 (48) P= .661	1.0000 (48) P= .	-.0297 (48) P= .841	.1065 (48) P= .471	.4315 (48) P= .002	-.5770 (48) P= .000
P_SELCRI	.0851 (48) P= .565	-.0297 (48) P= .841	1.0000 (48) P= .	-.4153 (48) P= .003	-.1369 (48) P= .353	-.0386 (48) P= .795
P_TENPRO	-.1498 (48) P= .310	.1065 (48) P= .471	-.4153 (48) P= .003	1.0000 (48) P= .	.2552 (48) P= .080	-.2732 (48) P= .060

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	P_REL	P_RISKAL	P_SELCRI	P_TENPRO	P_WKSCOP	R_ADR
P_WKSCOP	.5357 (48) P= .000	.4315 (48) P= .002	-.1369 (48) P= .353	.2552 (48) P= .080	1.0000 (48) P= .	-.3668 (48) P= .010
R_ADR	.0205 (48) P= .890	-.5770 (48) P= .000	-.0386 (48) P= .795	-.2732 (48) P= .060	-.3668 (48) P= .010	1.0000 (48) P= .
R_ADV_CL	.0315 (48) P= .832	.0233 (48) P= .875	-.0146 (48) P= .921	-.0280 (48) P= .850	.0652 (48) P= .660	.1536 (48) P= .297
R_ADV_CO	.3288 (48) P= .022	-.1063 (48) P= .472	.0851 (48) P= .565	-.2026 (48) P= .167	.1215 (48) P= .411	-.0130 (48) P= .930
R_EQUAB	-.1224 (48) P= .407	-.0128 (48) P= .931	.1523 (48) P= .301	-.1506 (48) P= .307	-.2179 (48) P= .137	-.0448 (48) P= .762
R_FUT_CL	-.1425 (48) P= .334	-.4925 (48) P= .000	.1981 (48) P= .177	-.1484 (48) P= .314	-.3612 (48) P= .012	.5142 (48) P= .000
R_FUT_CO	.0293 (48) P= .843	-.3640 (48) P= .011	.2679 (48) P= .066	-.1140 (48) P= .441	-.1440 (48) P= .329	.2988 (48) P= .039
R_INC_CL	.1607 (48) P= .275	-.3923 (48) P= .006	.0120 (48) P= .935	.0040 (48) P= .979	-.0329 (48) P= .824	.1948 (48) P= .184
R_INC_CO	.2127 (48) P= .147	-.2017 (48) P= .169	.0968 (48) P= .513	-.0102 (48) P= .945	.0065 (48) P= .965	.2204 (48) P= .132
R_MAN_CL	.3636 (48) P= .011	-.2886 (48) P= .047	.0575 (48) P= .698	-.0254 (48) P= .864	.1689 (48) P= .251	.3039 (48) P= .036
R_MAN_CO	-.1293 (48) P= .381	.0557 (48) P= .707	-.3760 (48) P= .008	.0847 (48) P= .567	-.1166 (48) P= .430	-.0446 (48) P= .764

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	P_REL	P_RISKAL	P_SELCRI	P_TENPRO	P_WKSCOP	R_ADR
R_NEG_CL	.4728 (48) P= .001	-.2808 (48) P= .053	.3065 (48) P= .034	-.3682 (48) P= .010	.0420 (48) P= .777	.0035 (48) P= .981
R_NEG_CO	.5223 (48) P= .000	-.1094 (48) P= .459	.3592 (48) P= .012	-.3474 (48) P= .016	.1735 (48) P= .238	-.0690 (48) P= .641
R_TRUST	.5588 (48) P= .000	-.1557 (48) P= .291	.1544 (48) P= .295	-.0873 (48) P= .555	.1856 (48) P= .206	-.0152 (48) P= .918

(Coefficient / (Cases) / 2-tailed Significance)

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- - Correlation Coefficients - -

	R_ADV_CL	R_ADV_CO	R_EQUAB	R_FUT_CL	R_FUT_CO	R_INC_CL
E_INFL	-.1438	-.0591	.0797	-.1570	-.2765	-.4167
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .330	P= .690	P= .590	P= .287	P= .057	P= .003
E_INTRAT	.0920	-.1213	-.1315	.0161	-.0147	-.2170
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .534	P= .411	P= .373	P= .914	P= .921	P= .138
E_TENIN	-.1439	-.3369	-.0710	.0481	-.2158	-.1131
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .329	P= .019	P= .631	P= .746	P= .141	P= .444
E_WKLD1	.2623	.2952	-.0105	.2710	.3957	.2321
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .072	P= .042	P= .944	P= .062	P= .005	P= .112
E_WKLD2	-.0816	-.4291	.0066	-.1162	-.2843	-.1728
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .582	P= .002	P= .964	P= .432	P= .050	P= .240
O_BUDGET	-.0135	-.1682	-.0381	.1138	.1359	-.0714
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .928	P= .253	P= .797	P= .441	P= .357	P= .630
O_C_CLAM	.0296	.1656	-.0487	.1226	.0924	-.0699
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .841	P= .261	P= .742	P= .407	P= .532	P= .637
O_CAP_CO	-.2396	.0254	-.1354	.1745	.1206	.0363
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .101	P= .864	P= .359	P= .236	P= .414	P= .806
O_CLEXP	-.1893	-.0009	.0867	.0122	-.1597	-.2108
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .197	P= .995	P= .558	P= .934	P= .278	P= .150
O_COEXP	-.1267	-.0077	-.0177	-.0766	-.0760	.0878
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .391	P= .959	P= .905	P= .605	P= .607	P= .553
O_ORG_CL	-.2152	-.2291	-.0782	-.3989	-.3491	-.3675
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .142	P= .117	P= .597	P= .005	P= .015	P= .010

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	R_ADV_CL	R_ADV_CO	R_EQUAB	R_FUT_CL	R_FUT_CO	R_INC_CL
O_ORG_CO	.0335	-.1791	.1254	.0275	-.1062	-.1334
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .821	P= .223	P= .396	P= .853	P= .473	P= .366
O_PRWKRE	-.2554	-.2570	-.2721	-.2270	-.3086	-.2426
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .080	P= .078	P= .061	P= .121	P= .033	P= .097
P_CONCOM	.1660	.0828	-.0788	-.1001	-.0775	-.0801
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .259	P= .576	P= .595	P= .499	P= .600	P= .588
P_DESCH	.2197	.2672	-.0666	.2329	.2142	.2658
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .134	P= .066	P= .653	P= .111	P= .144	P= .068
P_DESCOM	.1233	.0873	-.0702	-.0404	.0739	-.0320
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .404	P= .555	P= .635	P= .785	P= .617	P= .829
P_INV_CL	-.0746	-.2202	-.2092	-.0126	-.1758	-.3453
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .614	P= .133	P= .154	P= .932	P= .232	P= .016
P_NOMIN	-.1291	.0289	-.0412	-.4097	-.2875	.0354
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .382	P= .845	P= .781	P= .004	P= .048	P= .811
P_REL	.0315	.3288	-.1224	-.1425	.0293	.1607
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .832	P= .022	P= .407	P= .334	P= .843	P= .275
P_RISKAL	.0233	-.1063	-.0128	-.4925	-.3640	-.3923
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .875	P= .472	P= .931	P= .000	P= .011	P= .006
P_SELCRI	-.0146	.0851	.1523	.1981	.2679	.0120
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .921	P= .565	P= .301	P= .177	P= .066	P= .935
P_TENPRO	-.0280	-.2026	-.1506	-.1484	-.1140	.0040
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .850	P= .167	P= .307	P= .314	P= .441	P= .979

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	R_ADV_CL	R_ADV_CO	R_EQUAB	R_FUT_CL	R_FUT_CO	R_INC_CL
P_WKSCOP	.0652	.1215	-.2179	-.3612	-.1440	-.0329
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .660	P= .411	P= .137	P= .012	P= .329	P= .824
R_ADR	.1536	-.0130	-.0448	.5142	.2988	.1948
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .297	P= .930	P= .762	P= .000	P= .039	P= .184
R_ADV_CL	1.0000	.2001	.0895	-.1068	.1209	-.0478
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .	P= .173	P= .545	P= .470	P= .413	P= .747
R_ADV_CO	.2001	1.0000	-.0899	-.0553	.1137	.4608
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .173	P= .	P= .543	P= .709	P= .442	P= .001
R_EQUAB	.0895	-.0899	1.0000	-.0773	-.0169	-.0996
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .545	P= .543	P= .	P= .602	P= .909	P= .501
R_FUT_CL	-.1068	-.0553	-.0773	1.0000	.7192	.3308
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .470	P= .709	P= .602	P= .	P= .000	P= .022
R_FUT_CO	.1209	.1137	-.0169	.7192	1.0000	.4847
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .413	P= .442	P= .909	P= .000	P= .	P= .000
R_INC_CL	-.0478	.4608	-.0996	.3308	.4847	1.0000
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .747	P= .001	P= .501	P= .022	P= .000	P= .
R_INC_CO	.3153	.0976	-.1934	.2326	.5075	.4913
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .029	P= .509	P= .188	P= .112	P= .000	P= .000
R_MAN_CL	.2615	.3399	-.0741	-.0367	.0469	.1510
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .073	P= .018	P= .617	P= .804	P= .751	P= .306
R_MAN_CO	.0948	-.2850	.2030	-.0323	.0304	-.1523
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .521	P= .050	P= .166	P= .828	P= .838	P= .302

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	R_ADV_CL	R_ADV_CO	R_EQUAB	R_FUT_CL	R_FUT_CO	R_INC_CL
R_NEG_CL	-.0597	.4856	.0207	-.0272	.1096	.3230
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .687	P= .000	P= .889	P= .854	P= .458	P= .025
R_NEG_CO	.0375	.0508	-.0167	.0554	.1472	-.0025
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .800	P= .731	P= .910	P= .708	P= .318	P= .986
R_TRUST	.1434	.2399	.0434	-.1318	-.0431	.1801
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .331	P= .101	P= .770	P= .372	P= .771	P= .221

(Coefficient / (Cases) / 2-tailed Significance)

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- - Correlation Coefficients - -

	R_INC_CO	R_MAN_CL	R_MAN_CO	R_NEG_CL	R_NEG_CO	R_TRUST
E_INFL	-.3727	.1425	-.1613	-.1260	-.1454	-.2863
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .009	P= .334	P= .273	P= .393	P= .324	P= .048
E_INTRAT	.1902	-.1022	.1933	-.0901	.1612	.0805
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .195	P= .490	P= .188	P= .543	P= .274	P= .587
E_TENIN	-.1474	-.1300	.0563	-.0701	.1075	-.0411
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .317	P= .378	P= .704	P= .636	P= .467	P= .782
E_WKLD1	.4153	.1237	-.0906	.1174	.0243	.1083
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .003	P= .402	P= .540	P= .427	P= .870	P= .464
E_WKLD2	-.1401	-.1785	.0625	-.2134	-.1924	-.2448
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .342	P= .225	P= .673	P= .145	P= .190	P= .094
O_BUDGET	.1796	.1308	.0237	.1546	.0673	.0355
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .222	P= .375	P= .873	P= .294	P= .650	P= .811
O_C_CLAM	-.0139	.1697	-.0514	.0201	.0503	-.1841
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .925	P= .249	P= .729	P= .892	P= .734	P= .210
O_CAP_CO	-.0482	-.1651	-.0015	-.2642	-.2719	-.3902
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .745	P= .262	P= .992	P= .070	P= .062	P= .006
O_CLEXP	-.2298	-.2476	.0016	-.0698	-.1417	-.0031
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .116	P= .090	P= .991	P= .637	P= .337	P= .983
O_COEXP	.0189	.0007	.0089	.2399	.0356	-.0200
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .898	P= .996	P= .952	P= .101	P= .810	P= .893
O_ORG_CL	-.3374	-.4037	.0446	-.2721	-.1697	-.2251
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .019	P= .004	P= .763	P= .061	P= .249	P= .124

(Coefficient / (Cases) / 2-tailed Significance)

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- - Correlation Coefficients - -

	R_INC_CO	R_MAN_CL	R_MAN_CO	R_NEG_CL	R_NEG_CO	R_TRUST
O_ORG_CO	-.0521	-.1020	.1864	-.1434	-.1223	-.0170
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .725	P= .490	P= .205	P= .331	P= .408	P= .909
O_PRWKRE	-.2755	-.1861	.2015	-.2787	-.3986	-.3947
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .058	P= .205	P= .170	P= .055	P= .005	P= .005
P_CONCOM	.0041	.3453	-.0363	.1397	.0136	.0492
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .978	P= .016	P= .806	P= .344	P= .927	P= .740
P_DESCH	.2160	.1445	-.1601	.0578	-.0702	.2059
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .140	P= .327	P= .277	P= .696	P= .636	P= .160
P_DESCOM	.0599	.3651	-.0118	.0924	.1191	.1503
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .686	P= .011	P= .936	P= .532	P= .420	P= .308
P_INV_CL	-.1827	-.2174	-.0662	-.2752	-.0865	-.2904
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .214	P= .138	P= .655	P= .058	P= .559	P= .045
P_NOMIN	-.1383	-.1218	.0358	.1082	.1394	.1627
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .349	P= .410	P= .809	P= .464	P= .345	P= .269
P_REL	.2127	.3636	-.1293	.4728	.5223	.5588
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .147	P= .011	P= .381	P= .001	P= .000	P= .000
P_RISKAL	-.2017	-.2886	.0557	-.2808	-.1094	-.1557
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .169	P= .047	P= .707	P= .053	P= .459	P= .291
P_SELCRI	.0968	.0575	-.3760	.3065	.3592	.1544
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .513	P= .698	P= .008	P= .034	P= .012	P= .295
P_TENPRO	-.0102	-.0254	.0847	-.3682	-.3474	-.0873
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .945	P= .864	P= .567	P= .010	P= .016	P= .555

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	R_INC_CO	R_MAN_CL	R_MAN_CO	R_NEG_CL	R_NEG_CO	R_TRUST
P_WKSCOP	.0065	.1689	-.1166	.0420	.1735	.1856
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .965	P= .251	P= .430	P= .777	P= .238	P= .206
R_ADR	.2204	.3039	-.0446	.0035	-.0690	-.0152
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .132	P= .036	P= .764	P= .981	P= .641	P= .918
R_ADV_CL	.3153	.2615	.0948	-.0597	.0375	.1434
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .029	P= .073	P= .521	P= .687	P= .800	P= .331
R_ADV_CO	.0976	.3399	-.2850	.4856	.0508	.2399
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .509	P= .018	P= .050	P= .000	P= .731	P= .101
R_EQUAB	-.1934	-.0741	.2030	.0207	-.0167	.0434
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .188	P= .617	P= .166	P= .889	P= .910	P= .770
R_FUT_CL	.2326	-.0367	-.0323	-.0272	.0554	-.1318
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .112	P= .804	P= .828	P= .854	P= .708	P= .372
R_FUT_CO	.5075	.0469	.0304	.1096	.1472	-.0431
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .000	P= .751	P= .838	P= .458	P= .318	P= .771
R_INC_CL	.4913	.1510	-.1523	.3230	-.0025	.1801
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .000	P= .306	P= .302	P= .025	P= .986	P= .221
R_INC_CO	1.0000	.0600	.0306	.2127	.2285	.2667
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .	P= .685	P= .836	P= .147	P= .118	P= .067
R_MAN_CL	.0600	1.0000	-.3154	.2148	.0348	.0557
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .685	P= .	P= .029	P= .143	P= .814	P= .707
R_MAN_CO	.0306	-.3154	1.0000	-.1406	.1325	-.0707
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .836	P= .029	P= .	P= .341	P= .369	P= .633

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	R_INC_CO	R_MAN_CL	R_MAN_CO	R_NEG_CL	R_NEG_CO	R_TRUST
R_NEG_CL	.2127	.2148	-.1406	1.0000	.5600	.4278
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .147	P= .143	P= .341	P= .	P= .000	P= .002
R_NEG_CO	.2285	.0348	.1325	.5600	1.0000	.4971
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .118	P= .814	P= .369	P= .000	P= .	P= .000
R_TRUST	.2667	.0557	-.0707	.4278	.4971	1.0000
	(48)	(48)	(48)	(48)	(48)	(48)
	P= .067	P= .707	P= .633	P= .002	P= .000	P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

Appendix F
MDA Preliminary Analyses- One Type of Variable at a Time

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

48 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
48 (Unweighted) cases will be used in the analysis.

Number of cases by group

DRS	Number of cases Unweighted	Weighted	Label
0	33	33.0	
1	15	15.0	
Total	48	48.0	

Group means

DRS	E_INFL	E_INTRAT	E_TENIN
0	.84906	8.29494	6.22148
1	.82983	8.42073	2.75013
Total	.84305	8.33425	5.13669

Group standard deviations

DRS	E_INFL	E_INTRAT	E_TENIN
0	.11503	.72658	3.62562
1	.10637	1.60452	3.52491
Total	.11163	1.06291	3.91088

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 46 degrees of freedom

Variable	Wilks' Lambda	F	Significance
E_INFL	.99349	.3014	.5857
E_INTRAT	.99693	.1418	.7082
E_TENIN	.82713	9.6139	.0033

```
- - - - - - - -  D I S C R I M I N A N T   A N A L Y S I S  - - - - - - - -

On groups defined by DRS       DISPUTE RESOLUTION SATISFACTION


Analysis number       1

Stepwise variable selection
     Selection rule:  maximize minimum Mahalanobis distance (D squared)
                      between groups
     Maximum number of steps..................         6
     Minimum tolerance level..................    .00100
     Minimum F to enter....................... 1.00000
     Maximum F to remove......................    .90000

Canonical Discriminant Functions

     Maximum number of functions..............         1
     Minimum cumulative percent of variance...    100.00
     Maximum significance of Wilks' Lambda....    1.0000

Prior probabilities

   Group    Prior     Label

       0    .68750
       1    .31250

   Total   1.00000

---------------- Variables in the Analysis after Step 1 ----------------

Variable  Tolerance  F to Remove     D Squared     Between Groups

E_TENIN   1.0000000        9.6139

---------------- Variables not in the Analysis after Step 1 ----------------

                       Minimum
Variable  Tolerance  Tolerance  F to Enter      D Squared     Between Groups

E_INFL     .9993593   .9993593     .3187966      .9704596        0        1
E_INTRAT   .9771567   .9771567     .5915371     1.0031452        0        1

F level or tolerance or VIN insufficient for further computation.
```



```
                               Summary Table

           Action         Vars  Wilks'             Minimum
Step Entered Removed       in   Lambda   Sig.     D Squared  Sig.     Between Groups

  1  E_TENIN                1   .82713  .0033       .93225  .0033        0        1

Classification function coefficients
(Fisher's linear discriminant functions)

DRS      =          0              1


E_TENIN          .4813172        .2127606
(Constant)     -1.8719474      -1.4557107


                      Canonical Discriminant Functions


                  Pct of    Cum   Canonical   After  Wilks'
 Fcn Eigenvalue Variance   Pct      Corr       Fcn  Lambda   Chi-square  df  Sig

                                          :     0 .827132       8.636    1  .0033
  1*      .2090   100.00  100.00     .4158 :

   * Marks the 1 canonical discriminant functions remaining in the analysis.


Standardized canonical discriminant function coefficients

              Func  1

E_TENIN       1.00000


Structure matrix:

Pooled within-groups correlations between discriminating variables
                                    and canonical discriminant functions
(Variables ordered by size of correlation within function)

              Func  1

E_TENIN       1.00000
E_INTRAT       .15114
E_INFL        -.02531
```

Unstandardized canonical discriminant function coefficients

	Func 1
E_TENIN	.2781433
(Constant)	-1.4287355

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	.30173
1	-.66380

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
0	1	2.576051
1	1	2.519711
Pooled within-groups covariance matrix	1	2.559237

Box's M	Approximate F	Degrees of freedom	Significance
.01534	.01494	1, 4121.4	.9027

Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0		0	.6358	.6894	1	.3106	-.1718
2			0	**	1	.2098	.7086	0	.2914	-1.9180
3			0	**	1	.0741	.8025	0	.1975	-2.4495
4			0	**	1	.2623	.6814	0	.3186	-1.7848
5			0	**	1	.5374	.5679	0	.4321	-1.2805
6			0	**	1	.5854	.5509	0	.4491	-1.2093
7			0		0	.4691	.6355	1	.3645	-.4221
8			0		0	.6584	.6959	1	.3041	-.1404
9			0		0	.8829	.7526	1	.2474	.1545
10			0		0	.5637	.8596	1	.1404	.8790
11			0		0	.6661	.8417	1	.1583	.7333
12			0		0	.2500	.9141	1	.0859	1.4520
13			0		0	.4927	.8718	1	.1282	.9878
14			0		0	.6046	.8525	1	.1475	.8195
15			0		0	.6472	.8451	1	.1549	.7594
16			0		0	.2050	.9226	1	.0774	1.5691
17			0		0	.3888	.8896	1	.1104	1.1636
18			0		0	.7113	.8337	1	.1663	.6718
19			0		0	.7498	.8267	1	.1733	.6206
20			0		0	.6462	.6924	1	.3076	-.1573
21			0		0	.7180	.7122	1	.2878	-.0594
22			0		0	.9259	.7932	1	.2068	.3948
23			0		0	.4494	.8792	1	.1208	1.0581
24			0		0	.5350	.8645	1	.1355	.9221
25			0		0	.5749	.8577	1	.1423	.8626
26			0		0	.8460	.8088	1	.1912	.4960
27			0		0	.7105	.8338	1	.1662	.6729
28			0		0	.7498	.8267	1	.1733	.6206
29			0		0	.6208	.8497	1	.1503	.7964
30			0		0	.1838	.9268	1	.0732	1.6308
31			0		0	.6876	.8379	1	.1621	.7038
32			0		0	.6817	.8390	1	.1610	.7119
33			0		0	.5701	.8585	1	.1415	.8696
34			1		1	.5080	.5786	0	.4214	-1.3258
35			1	**	0	.2794	.5524	1	.4476	-.7798
36			1	**	0	.6157	.6835	1	.3165	-.2002
37			1	**	0	.4085	.6122	1	.3878	-.5248
38			1	**	0	.2188	.5168	1	.4832	-.9281
39			1		1	.6513	.5285	0	.4715	-1.1158
40			1		1	.0821	.7951	0	.2049	-2.4022
41			1		1	.5122	.5770	0	.4230	-1.3191
42			1		1	.1942	.7173	0	.2827	-1.9619
43			1	**	0	.3053	.5658	1	.4342	-.7234
44			1	**	0	.4967	.6453	1	.3547	-.3779
45			1	**	0	.2188	.5168	1	.4832	-.9281
46			1	**	0	.6817	.8390	1	.1610	.7119
47			1	**	0	.4193	.8844	1	.1156	1.1093
48			1	**	0	.6120	.8512	1	.1488	.8089

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

All-groups Stacked Histogram

Canonical Discriminant Function 1

```
           8 +                                                             +
             |                                                             |
             |                                                             |
F            |                                                             |
r          6 +                                      2                      +
e            |                                      2                      |
q            |                                      1                      |
u            |                                      1                      |
e          4 +                                     121                     +
n            |                                     121                     |
c            |                 2          2        111                     |
y            |                 2          2        111                     |
           2 +      2          2   2    2 11      1111 2    1              +
             |      2          2   2    2 11      1111 2    1              |
             |      1   211    112 222 21 11   1 111111111 11              |
             |      1   211    112 222 21 11   1 111111111 11              |
             X----------+---------+---------+---------+---------+----------X
            out       -2.0      -1.0       .0        1.0       2.0       out
  Class       2222222222222222222221111111111111111111111111111111111111111
Centroids                             2         1
```

Classification results -

Actual Group	No. of Cases	Predicted Group Membership 0	1
Group 0	33	28	5
		84.8%	15.2%
Group 1	15	10	5
		66.7%	33.3%

Percent of "grouped" cases correctly classified: 68.75%

Classification processing summary

48 (Unweighted) cases were processed.
0 cases were excluded for missing or out-of-range group codes.
0 cases had at least one missing discriminating variable.
48 (Unweighted) cases were used for printed output.

-------- D I S C R I M I N A N T   A N A L Y S I S --------

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

48 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
48 (Unweighted) cases will be used in the analysis.

Number of cases by group

DRS	Number of cases Unweighted	Weighted	Label
0	33	33.0	
1	15	15.0	
Total	48	48.0	

Group means

DRS	O_BUDGET	O_C_CLAM	O_CAP_CO	O_CLEXP
0	1.10140	.71864	.85000	7.15152
1	1.11280	3.19447	.86333	7.06667
Total	1.10496	1.49233	.85417	7.12500

DRS	O_COEXP	O_PRWKRE
0	3.84848	3.24242
1	2.60000	.93333
Total	3.45833	2.52083

Group standard deviations

DRS	O_BUDGET	O_C_CLAM	O_CAP_CO	O_CLEXP
0	.15225	.73667	.26041	7.04504
1	.14299	8.61436	.23939	6.83966
Total	.14799	4.88044	.25156	6.90860

DRS	O_COEXP	O_PRWKRE
0	2.98037	4.30138
1	2.50143	1.38701
Total	2.87290	3.78682

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 46 degrees of freedom

Variable	Wilks' Lambda	F	Significance
O_BUDGET	.99870	.0599	.8077
O_C_CLAM	.94353	2.7529	.1039
O_CAP_CO	.99938	.0284	.8670
O_CLEXP	.99997	.0015	.9690
O_COEXP	.95856	1.9885	.1652
O_PRWKRE	.91842	4.0862	.0491

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS   DISPUTE RESOLUTION SATISFACTION

Analysis number 1

Stepwise variable selection
Selection rule: maximize minimum Mahalanobis distance (D squared) between groups
Maximum number of steps.................. 12
Minimum tolerance level.................. .00100
Minimum F to enter....................... 1.00000
Maximum F to remove...................... .90000

Canonical Discriminant Functions

Maximum number of functions.............. 1
Minimum cumulative percent of variance... 100.00
Maximum significance of Wilks' Lambda.... 1.0000

Prior probabilities

Group	Prior	Label
0	.68750	
1	.31250	
Total	1.00000	

---------------- Variables in the Analysis after Step 2 ----------------

Variable	Tolerance	F to Remove	D Squared	Between Groups	
O_C_CLAM	.9988612	2.6840	.3962356	0	1
O_PRWKRE	.9988612	3.9880	.2669476	0	1

---------------- Variables not in the Analysis after Step 2 ----------------

Variable	Tolerance	Minimum Tolerance	F to Enter	D Squared	Between Groups	
O_BUDGET	.8597117	.8597117	.4341595	.7366973	0	1
O_CAP_CO	.9521356	.9521356	.1375334	.7020020	0	1
O_CLEXP	.9376067	.9376067	.3360192	.7252182	0	1
O_COEXP	.8893605	.8887546	.4369954	.7370290	0	1

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered	Removed	Vars in	Wilks' Lambda	Sig.	Minimum D Squared	Sig.	Between Groups	
1	O_PRWKRE		1	.91842	.0491	.39624	.0491	0	1
2	O_C_CLAM		2	.86672	.0400	.68592	.0400	0	1

Classification function coefficients
(Fisher's linear discriminant functions)

DRS =	0	1
O_C_CLAM	.0251001	.1374825
O_PRWKRE	.2398515	.0632992
(Constant)	-.7725625	-1.4122821

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	After Fcn	Wilks' Lambda	Chi-square	df	Sig
				:	0	.866723	6.437	2	.0400
1*	.1538	100.00	100.00	.3651 :					

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
O_C_CLAM	-.65024
O_PRWKRE	.78199

Structure matrix:

Pooled within-groups correlations between discriminating variables
and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
O_PRWKRE	.76005
O_C_CLAM	-.62385
O_BUDGET	-.34434
O_COEXP	.27277
O_CLEXP	.24646
O_CAP_CO	.08610

Unstandardized canonical discriminant function coefficients

	Func 1
O_C_CLAM	-.1356948
O_PRWKRE	.2131759
(Constant)	-.3348791

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	.25881
1	-.56939

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
0	2	2.170708
1	2	4.958358
Pooled within-groups covariance matrix	2	5.732169

Box's M	Approximate F	Degrees of freedom		Significance
124.80011	39.16026	3,	15614.9	.0000

Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0		0	.4527	.6247	1	.3753	-.4922
2			0		0	.6248	.6740	1	.3260	-.2303
3			0		0	.9901	.7542	1	.2458	.2464
4			0		0	.5527	.6547	1	.3453	-.3349
5			0		0	.5449	.6525	1	.3475	-.3465
6			0		0	.6248	.6740	1	.3260	-.2303
7			0		0	.2202	.8954	1	.1046	1.4848
8			0		0	.5369	.8379	1	.1621	.8763
9			0		0	.4782	.6328	1	.3672	-.4504
10			0		0	.6935	.6911	1	.3089	-.1353
11			0		0	.6703	.6854	1	.3146	-.1669
12			0		0	.4876	.6357	1	.3643	-.4353
13			0		0	.0170	.9572	1	.0428	2.6456
14			0		0	.5527	.6547	1	.3453	-.3349
15			0		0	.9500	.7464	1	.2536	.1961
16			0		0	.6368	.8209	1	.1791	.7310
17			0		0	.7933	.7139	1	.2861	-.0032
18			0		0	.2691	.8856	1	.1144	1.3640
19			0		0	.5507	.6541	1	.3459	-.3379
20			0		0	.0174	.9569	1	.0431	2.6366
21			0		0	.4825	.6341	1	.3659	-.4434
22			0		0	.9634	.7630	1	.2370	.3046
23			0		0	.5404	.6512	1	.3488	-.3533
24			0		0	.4957	.6381	1	.3619	-.4224
25			0		0	.2663	.8862	1	.1138	1.3705
26			0		0	.7036	.6934	1	.3066	-.1217
27			0		0	.4540	.6251	1	.3749	-.4900
28			0		0	.6195	.8239	1	.1761	.7554
29			0		0	.8538	.7269	1	.2731	.0745
30			0		0	.4453	.6223	1	.3777	-.5045
31			0		0	.7956	.7935	1	.2065	.5178
32			0		0	.1712	.9059	1	.0941	1.6273
33			0		0	.4741	.6315	1	.3685	-.4570
34			1	**	0	.9424	.7449	1	.2551	.1866
35			1	**	0	.5347	.6496	1	.3504	-.3620
36			1	**	0	.6985	.6922	1	.3078	-.1285
37			1	**	0	.5486	.6535	1	.3465	-.3410
38			1	**	0	.1898	.5114	1	.4886	-1.0523
39			1	**	0	.5287	.6479	1	.3521	-.3711
40			1	**	0	.5347	.6496	1	.3504	-.3620
41			1	**	0	.6057	.6690	1	.3310	-.2574
42			1	**	0	.8272	.7879	1	.2121	.4771
43			1	**	0	.8141	.7184	1	.2816	.0236
44			1	**	0	.5229	.6462	1	.3538	-.3801
45			1	**	0	.5313	.6486	1	.3514	-.3672
46			1	**	0	.4898	.6363	1	.3637	-.4318
47			1	**	0	.5347	.6496	1	.3504	-.3620
48			1		1	.0000	.9556	0	.0444	-4.8128

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

All-groups Stacked Histogram

Canonical Discriminant Function 1

```
      16 +                                                             +
         |                                                             |
         |                                                             |
F        |                                                             |
r     12 +                                                             +
e        |                          2                                  |
q        |                          2                                  |
u        |                          2                                  |
e      8 +                          2                                  +
n        |                          2                                  |
c        |                          22                                 |
y        |                         122                                 |
       4 +                         111                                 +
         |                         11112  2                            |
         |                         111112 1  2        1           1    |
         |2                  2     111111111 1 111    111         1    |
         X----------+---------+---------+---------+---------+---------X
        out      -2.0      -1.0        .0       1.0       2.0       out
  Class  222222222222222222221111111111111111111111111111111111111111111
Centroids                          2       1
```

Classification results -

Actual Group		No. of Cases	Predicted Group Membership 0	1
Group	0	33	33 100.0%	0 .0%
Group	1	15	14 93.3%	1 6.7%

Percent of "grouped" cases correctly classified: 70.83%

Classification processing summary

48 (Unweighted) cases were processed.
0 cases were excluded for missing or out-of-range group codes.
0 cases had at least one missing discriminating variable.
48 (Unweighted) cases were used for printed output.

-------- D I S C R I M I N A N T   A N A L Y S I S --------

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

48 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
48 (Unweighted) cases will be used in the analysis.

Number of cases by group

DRS	Number of cases Unweighted	Weighted	Label
0	33	33.0	
1	15	15.0	
Total	48	48.0	

Group means

DRS	P_DESCH	P_DESCOM	P_INV_CL	P_NOMIN
0	.09403	3.00000	4.03030	.25606
1	.15580	3.00000	3.40000	.17200
Total	.11333	3.00000	3.83333	.22979

DRS	P_REL	P_SELCRI
0	2.30303	4.51515
1	3.20000	4.93333
Total	2.58333	4.64583

Group standard deviations

DRS	P_DESCH	P_DESCOM	P_INV_CL	P_NOMIN
0	.06323	1.27475	1.23705	.21823
1	.07283	1.19523	1.45406	.28456
Total	.07169	1.23771	1.32622	.24103

DRS	P_REL	P_SELCRI
0	1.26206	1.50252
1	1.20712	.79881
Total	1.30194	1.32873

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 46 degrees of freedom

Variable	Wilks' Lambda	F	Significance
P_DESCH	.83709	8.9520	.0044
P_DESCOM	1.00000	.0000	1.0000
P_INV_CL	.95044	2.3986	.1283
P_NOMIN	.97331	1.2613	.2672
P_REL	.89585	5.3477	.0253
P_SELCRI	.97827	1.0219	.3173

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS   DISPUTE RESOLUTION SATISFACTION

Analysis number 1

Stepwise variable selection
Selection rule: maximize minimum Mahalanobis distance (D squared) between groups

Maximum number of steps.................. 12
Minimum tolerance level.................. .00100
Minimum F to enter....................... 1.00000
Maximum F to remove...................... .90000

Canonical Discriminant Functions

Maximum number of functions.............. 1
Minimum cumulative percent of variance... 100.00
Maximum significance of Wilks' Lambda.... 1.0000

Prior probabilities

Group	Prior	Label
0	.68750	
1	.31250	
Total	1.00000	

---------------- Variables in the Analysis after Step 3 ----------------

Variable	Tolerance	F to Remove	D Squared	Between Groups	
P_DESCH	.9909893	7.0047	.8165189	0	1
P_NOMIN	.9311657	1.6077	1.4409842	0	1
P_REL	.9379653	5.8605	.9376211	0	1

---------------- Variables not in the Analysis after Step 3 ----------------

Variable	Tolerance	Minimum Tolerance	F to Enter	D Squared	Between Groups	
P_DESCOM	.7949130	.7949130	.9793592	1.7959491	0	1
P_INV_CL	.9715832	.9187903	.7897931	1.7689812	0	1
P_SELCRI	.9956904	.9304523	.7025183	1.7565654	0	1

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered	Removed	Vars in	Wilks' Lambda	Sig.	Minimum D Squared	Sig.	Between Groups	
1	P_DESCH		1	.83709	.0044	.86807	.0044	0	1
2	P_REL		2	.75583	.0018	1.44098	.0018	0	1
3	P_NOMIN		3	.72919	.0028	1.65662	.0028	0	1

Classification function coefficients
(Fisher's linear discriminant functions)

DRS =	0	1
P_DESCH	23.5059723	37.3937999
P_NOMIN	3.2655805	1.2634925
P_REL	1.3763815	2.0792823
(Constant)	-3.4828477	-7.5116398

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	:	After Fcn	Wilks' Lambda	Chi-square	df	Sig
					:	0	.729187	14.054	3	.0028
1*	.3714	100.00	100.00	.5204	:					

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
P_DESCH	.71535
P_NOMIN	-.37389
P_REL	.68024

Structure matrix:

Pooled within-groups correlations between discriminating variables and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
P_DESCH	.72388
P_REL	.55948
P_NOMIN	-.27171
P_DESCOM	.25856
P_INV_CL	-.11800
P_SELCRI	-.00051

Unstandardized canonical discriminant function coefficients

	Func 1
P_DESCH	10.7900212
P_NOMIN	-1.5555041
P_REL	.5461124
(Constant)	-2.2762175

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	-.40222
1	.88488

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
0	3	-8.128363
1	3	-8.089620
Pooled within-groups covariance matrix	3	-7.912008

Box's M	Approximate F	Degrees of freedom		Significance
9.40990	1.42885	6,	4834.4	.1991

Case Number	Mis Val	Sel	Actual Group		Highest Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0	**	1	.3376	.7814	0	.2186	1.8438
2			0		0	.2328	.9590	1	.0410	-1.5953
3			0		0	.8762	.8602	1	.1398	-.5581
4			0		0	.8086	.8731	1	.1269	-.6445
5			0		0	.7144	.8897	1	.1103	-.7682
6			0		0	.5777	.7110	1	.2890	.1545
7			0		0	.2543	.9562	1	.0438	-1.5421
8			0		0	.1372	.9715	1	.0285	-1.8886
9			0		0	.7943	.8757	1	.1243	-.6630
10			0	**	1	.7554	.6085	0	.3915	1.1964
11			0		0	.2225	.9603	1	.0397	-1.6222
12			0		0	.5981	.9085	1	.0915	-.9294
13			0		0	.6505	.9002	1	.0998	-.8553
14			0		0	.8086	.8731	1	.1269	-.6445
15			0		0	.1456	.9704	1	.0296	-1.8575
16			0		0	.7262	.8877	1	.1123	-.7524
17			0		0	.4700	.9274	1	.0726	-1.1247
18			0		0	.7701	.7757	1	.2243	-.1099
19			0		0	.3333	.5918	1	.4082	.5653
20			0		0	.8096	.7869	1	.2131	-.1612
21			0		0	.8142	.8720	1	.1280	-.6372
22			0		0	.5900	.9097	1	.0903	-.9410
23			0	**	1	.4139	.7486	0	.2514	1.7019
24			0	**	1	.4667	.7265	0	.2735	1.6128
25			0		0	.9383	.8477	1	.1523	-.4796
26			0		0	.9736	.8402	1	.1598	-.4353
27			0		0	.4505	.9301	1	.0699	-1.1568
28			0		0	.3057	.9496	1	.0504	-1.4266
29			0		0	.5714	.9126	1	.0874	-.9682
30			0	**	1	.2323	.8288	0	.1712	2.0795
31			0	**	1	.9290	.5386	0	.4614	.9740
32			0		0	.8655	.8623	1	.1377	-.5716
33			0		0	.5055	.9223	1	.0777	-1.0681
34			1	**	0	.2196	.5092	1	.4908	.8254
35			1		1	.9297	.5383	0	.4617	.9731
36			1		1	.2428	.8240	0	.1760	2.0530
37			1		1	.8661	.5639	0	.4361	1.0535
38			1		1	.2401	.8252	0	.1748	2.0596
39			1		1	.3947	.7568	0	.2432	1.7359
40			1	**	0	.3561	.6056	1	.3944	.5206
41			1	**	0	.2445	.5297	1	.4703	.7616
42			1	**	0	.9842	.8379	1	.1621	-.4221
43			1		1	.5167	.7057	0	.2943	1.5333
44			1	**	0	.2459	.5308	1	.4692	.7582
45			1	**	0	.6963	.7530	1	.2470	-.0119
46			1		1	.9290	.5386	0	.4614	.9740
47			1	**	0	.7663	.7746	1	.2254	-.1050
48			1	**	0	.3339	.5922	1	.4078	.5640

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

All-groups Stacked Histogram

Canonical Discriminant Function 1

```
         8 +                                                             +
           |                                                             |
           |                                                             |
 F         |                                                             |
 r       6 +                                                             +
 e         |                                                             |
 q         |                       1                                     |
 u         |                       1                                     |
 e       4 +                       1                                     +
 n         |                       1                                     |
 c         |                    1  1              2 2         2          |
 y         |                    1  1              2 2         2          |
         2 +          1  1    1 11 1 2   2     2  2 2     2   2          +
           |          1  1    1 11 1 2   2     2  2 2     2   2          |
           |          1  111 111111111 112  1  21 2 121 2111  1          |
           |          1  111 111111111 112  1  21 2 121 2111  1          |
           X---------+---------+---------+----------+--------+----------X
          out      -2.0      -1.0       .0        1.0       2.0       out
      Class 11111111111111111111111111111111111111112222222222222222222222
  Centroids                           1             2
```

Classification results -

Actual Group		No. of Cases	Predicted Group Membership 0	1
Group	0	33	27 81.8%	6 18.2%
Group	1	15	8 53.3%	7 46.7%

Percent of "grouped" cases correctly classified: 70.83%

Classification processing summary

48 (Unweighted) cases were processed.
0 cases were excluded for missing or out-of-range group codes.
0 cases had at least one missing discriminating variable.
48 (Unweighted) cases were used for printed output.

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS   DISPUTE RESOLUTION SATISFACTION

48 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
48 (Unweighted) cases will be used in the analysis.

Number of cases by group

DRS	Number of cases Unweighted	Weighted	Label
0	33	33.0	
1	15	15.0	
Total	48	48.0	

Group means

DRS	R_ADR	R_ADV_CL	R_ADV_CO	R_EQUAB
0	2.72727	1.24242	1.48485	3.00000
1	3.66667	2.13333	3.40000	2.86667
Total	3.02083	1.52083	2.08333	2.95833

DRS	R_FUT_CL	R_FUT_CO	R_INC_CL	R_INC_CO
0	3.54545	3.48485	2.06061	2.00000
1	4.06667	4.80000	3.60000	3.06667
Total	3.70833	3.89583	2.54167	2.33333

DRS	R_MAN_CL	R_MAN_CO	R_NEG_CL
0	3.09091	3.03030	2.39394
1	4.66667	2.53333	3.00000
Total	3.58333	2.87500	2.58333

Group standard deviations

DRS	R_ADR	R_ADV_CL	R_ADV_CO	R_EQUAB
0	1.82470	.79177	1.27772	1.73205
1	2.05866	1.80739	2.02837	1.72654
Total	1.92950	1.25460	1.77252	1.71301

DRS	R_FUT_CL	R_FUT_CO	R_INC_CL	R_INC_CO
0	1.71557	1.62252	1.27327	1.11803
1	1.66762	1.26491	1.80476	1.79151
Total	1.70054	1.62742	1.61058	1.43413

DRS	R_MAN_CL	R_MAN_CO	R_NEG_CL
0	1.56851	1.53062	1.22320
1	1.29099	1.24595	1.41421
Total	1.64812	1.45317	1.30194

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 46 degrees of freedom

Variable	Wilks' Lambda	F	Significance
R_ADR	.94799	2.5236	.1190
R_ADV_CL	.88936	5.7227	.0209
R_ADV_CO	.74385	15.8401	.0002
R_EQUAB	.99867	.0612	.8057
R_FUT_CL	.97939	.9681	.3303
R_FUT_CO	.85671	7.6938	.0080
R_INC_CL	.79955	11.5322	.0014
R_INC_CO	.87862	6.3548	.0152
R_MAN_CL	.79943	11.5410	.0014
R_MAN_CO	.97434	1.2116	.2768
R_NEG_CL	.95245	2.2963	.1365

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS   DISPUTE RESOLUTION SATISFACTION

Analysis number 1

Stepwise variable selection
Selection rule: maximize minimum Mahalanobis distance (D squared) between groups

Maximum number of steps..................	22
Minimum tolerance level..................	.00100
Minimum F to enter.......................	1.00000
Maximum F to remove......................	.90000

Canonical Discriminant Functions

Maximum number of functions..............	1
Minimum cumulative percent of variance...	100.00
Maximum significance of Wilks' Lambda....	1.0000

Prior probabilities

Group	Prior	Label
0	.68750	
1	.31250	
Total	1.00000	

---------------- Variables in the Analysis after Step 4 ----------------

Variable	Tolerance	F to Remove	D Squared	Between Groups	
R_ADV_CO	.9696933	9.0941	2.4591486	0	1
R_FUT_CO	.8009498	3.2655	3.3309043	0	1
R_INC_CO	.8075965	1.8609	3.5748479	0	1
R_MAN_CL	.9580731	6.6139	2.8050630	0	1

---------------- Variables not in the Analysis after Step 4 ----------------

Variable	Tolerance	Minimum Tolerance	F to Enter	D Squared	Between Groups	
R_ADR	.8392159	.7615684	.0980993	3.9421849	0	1
R_ADV_CL	.9125969	.7508697	.9211127	4.1064586	0	1
R_EQUAB	.9411375	.7677733	.2673327	3.9759640	0	1
R_FUT_CL	.4486274	.3829250	.2162949	3.9657768	0	1
R_INC_CL	.6563747	.6563747	.1988885	3.9623025	0	1
R_MAN_CO	.8804883	.8002790	.0600147	3.9345832	0	1
R_NEG_CL	.7556662	.7556662	.7875264	4.0797947	0	1

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered Removed	Vars in	Wilks' Lambda	Sig.	Minimum D Squared	Sig.	Between Groups	
1	R_ADV_CO	1	.74385	.0002	1.53601	.0002	0	1
2	R_FUT_CO	2	.63947	.0000	2.51486	.0000	0	1
3	R_MAN_CL	3	.55512	.0000	3.57485	.0000	0	1
4	R_INC_CO	4	.53209	.0000	3.92260	.0000	0	1

Classification function coefficients
(Fisher's linear discriminant functions)

DRS =	0	1
R_ADV_CO	.5962904	1.3912892
R_FUT_CO	1.5660831	2.1305806
R_INC_CO	.5905987	1.0735242
R_MAN_CL	1.6011568	2.3262308
(Constant)	-6.6112888	-15.7156782

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr		After Fcn	Wilks' Lambda	Chi-square	df	Sig
					:	0	.532088	27.762	4	.0000
1*	.8794	100.00	100.00	.6840	:					

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
R_ADV_CO	.62028
R_FUT_CO	.43397
R_INC_CO	.33132
R_MAN_CL	.54531

Structure matrix:

Pooled within-groups correlations between discriminating variables
and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
R_ADV_CO	.62576
R_MAN_CL	.53414
R_INC_CL	.45243
R_FUT_CO	.43612
R_NEG_CL	.41227
R_INC_CO	.39635
R_FUT_CL	.22497
R_MAN_CO	-.22492
R_ADR	.18505
R_ADV_CL	.16931
R_EQUAB	-.15205

Unstandardized canonical discriminant function coefficients

	Func 1
R_ADV_CO	.4014017
R_FUT_CO	.2850196
R_INC_CO	.2438333
R_MAN_CL	.3660961
(Constant)	-3.8274311

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	-.61892
1	1.36163

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
0	4	2.127849
1	4	3.169160
Pooled within-groups covariance matrix	4	2.857701

Box's M	Approximate F	Degrees of freedom		Significance
18.99482	1.67380	10,	3572.5	.0808

Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0	**	1	.9701	.7768	0	.2232	1.3992
2			0		0	.4741	.7912	1	.2088	.0969
3			0		0	.5969	.9781	1	.0219	-1.1478
4			0		0	.6249	.8559	1	.1441	-.1300
5			0		0	.9354	.9484	1	.0516	-.7000
6			0		0	.7408	.9679	1	.0321	-.9497
7			0		0	.4401	.9863	1	.0137	-1.3910
8			0		0	.8707	.9557	1	.0443	-.7817
9			0		0	.3708	.7266	1	.2734	.2760
10			0		0	.5969	.8458	1	.1542	-.0901
11			0		0	.8064	.9059	1	.0941	-.3738
12			0		0	.7443	.8913	1	.1087	-.2927
13			0		0	.2380	.9939	1	.0061	-1.7989
14			0		0	.5150	.9827	1	.0173	-1.2700
15			0		0	.1796	.9955	1	.0045	-1.9610
16			0		0	.9027	.9522	1	.0478	-.7412
17			0		0	.1666	.9959	1	.0041	-2.0022
18			0		0	.5150	.8116	1	.1884	.0322
19			0		0	.4157	.7573	1	.2427	.1950
20			0		0	.2073	.9948	1	.0052	-1.8800
21			0		0	.0559	.9986	1	.0014	-2.5311
22			0		0	.2073	.9948	1	.0052	-1.8800
23			0		0	.4641	.7858	1	.2142	.1132
24			0	**	1	.9560	.7434	0	.2566	1.3064
25			0		0	.3091	.9915	1	.0085	-1.6361
26			0		0	.4393	.7717	1	.2283	.1545
27			0		0	.2905	.9922	1	.0078	-1.6760
28			0		0	.9022	.9246	1	.0754	-.4961
29			0		0	.5415	.8235	1	.1765	-.0084
30			0		0	.7143	.8834	1	.1166	-.2528
31			0		0	.9349	.9301	1	.0699	-.5372
32			0		0	.9354	.9302	1	.0698	-.5378
33			0	**	1	.7689	.6436	0	.3564	1.0678
34			1	**	0	.3313	.6955	1	.3045	.3525
35			1		1	.5711	.9084	0	.0916	1.9280
36			1		1	.6564	.5724	0	.4276	.9167
37			1	**	0	.9027	.9522	1	.0478	-.7412
38			1		1	.2780	.9652	0	.0348	2.4465
39			1		1	.6316	.8931	0	.1069	1.8411
40			1		1	.5605	.9110	0	.0890	1.9437
41			1		1	.7420	.6274	0	.3726	1.0325
42			1		1	.0262	.9962	0	.0038	3.5846
43			1	**	0	.2899	.6578	1	.3422	.4395
44			1		1	.9461	.7870	0	.2130	1.4293
45			1		1	.4723	.9306	0	.0694	2.0804
46			1	**	0	.3119	.6785	1	.3215	.3924
47			1		1	.9576	.7821	0	.2179	1.4148
48			1		1	.9982	.7645	0	.2355	1.3639

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

All-groups Stacked Histogram

Canonical Discriminant Function 1

```
          8 +                                                            +
            |                                                            |
   F        |                                                            |
   r      6 +                                                            +
   e        |                                                            |
   q        |                                    2                       |
   u        |                                    2                       |
   e      4 +                             11     2                       +
   n        |                             11     2                       |
   c        |                  1     21 1112   2 2  2                    |
   y        |                  1     21 1112   2 2  2                    |
          2 +                 111 1 1111112    2 1  2                    +
            |                 111 1 1111112    2 1  2                    |
            |              1  1111111111112    1 1 22 2          2       |
            |              1  1111111111112    1 1 22 2          2       |
             X----------+---------+---------+---------+---------+-------X
            out       -4.0      -2.0        .0       2.0       4.0     out
   Class     111111111111111111111111111111111111122222222222222222222222222
   Centroids                                1         2
```

Classification results -

Actual Group		No. of Cases	Predicted Group Membership 0	1
Group	0	33	30 90.9%	3 9.1%
Group	1	15	4 26.7%	11 73.3%

Percent of "grouped" cases correctly classified: 85.42%

Classification processing summary

```
48 (Unweighted) cases were processed.
 0 cases were excluded for missing or out-of-range group codes.
 0 cases had at least one missing discriminating variable.
48 (Unweighted) cases were used for printed output.
```

Appendix G
MDA Preliminary Analyses- Two Types of Variable at a Time

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

48 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
48 (Unweighted) cases will be used in the analysis.

Number of cases by group

DRS	Number of cases Unweighted	Weighted	Label
0	33	33.0	
1	15	15.0	
Total	48	48.0	

Group means

DRS	E_INFL	E_INTRAT	E_TENIN	O_BUDGET
0	.84906	8.29494	6.22148	1.10140
1	.82983	8.42073	2.75013	1.11280
Total	.84305	8.33425	5.13669	1.10496

DRS	O_C_CLAM	O_CAP_CO	O_CLEXP	O_COEXP
0	.71864	.85000	7.15152	3.84848
1	3.19447	.86333	7.06667	2.60000
Total	1.49233	.85417	7.12500	3.45833

DRS	O_PRWKRE
0	3.24242
1	.93333
Total	2.52083

Group standard deviations

DRS	E_INFL	E_INTRAT	E_TENIN	O_BUDGET
0	.11503	.72658	3.62562	.15225
1	.10637	1.60452	3.52491	.14299
Total	.11163	1.06291	3.91088	.14799

DRS	O_C_CLAM	O_CAP_CO	O_CLEXP	O_COEXP
0	.73667	.26041	7.04504	2.98037
1	8.61436	.23939	6.83966	2.50143
Total	4.88044	.25156	6.90860	2.87290

DRS	O_PRWKRE
0	4.30138
1	1.38701
Total	3.78682

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 46 degrees of freedom

Variable	Wilks' Lambda	F	Significance
E_INFL	.99349	.3014	.5857
E_INTRAT	.99693	.1418	.7082
E_TENIN	.82713	9.6139	.0033
O_BUDGET	.99870	.0599	.8077
O_C_CLAM	.94353	2.7529	.1039
O_CAP_CO	.99938	.0284	.8670
O_CLEXP	.99997	.0015	.9690
O_COEXP	.95856	1.9885	.1652
O_PRWKRE	.91842	4.0862	.0491

-------- D I S C R I M I N A N T   A N A L Y S I S --------

On groups defined by DRS   DISPUTE RESOLUTION SATISFACTION

Analysis number 1

Stepwise variable selection
Selection rule: maximize minimum Mahalanobis distance (D squared) between groups

Maximum number of steps..................	18
Minimum tolerance level..................	.00100
Minimum F to enter.......................	1.00000
Maximum F to remove......................	.90000

Canonical Discriminant Functions

Maximum number of functions..............	1
Minimum cumulative percent of variance...	100.00
Maximum significance of Wilks' Lambda....	1.0000

Prior probabilities

Group	Prior	Label
0	.68750	
1	.31250	
Total	1.00000	

---------------- Variables in the Analysis after Step 3 ----------------

Variable	Tolerance	F to Remove	D Squared	Between Groups	
E_TENIN	.9673305	10.1860	.6859152	0	1
O_C_CLAM	.9665349	3.9886	1.3505466	0	1
O_PRWKRE	.9982740	3.3924	1.4236608	0	1

---------------- Variables not in the Analysis after Step 3 ----------------

Variable	Tolerance	Minimum Tolerance	F to Enter	D Squared	Between Groups	
E_INFL	.9464132	.9464132	.1349191	1.8972185	0	1
E_INTRAT	.9651416	.9480923	.5583751	1.9596333	0	1
O_BUDGET	.8592216	.8592216	.2695983	1.9170693	0	1
O_CAP_CO	.9437447	.9437447	.3598973	1.9303789	0	1
O_CLEXP	.9371265	.9371265	.2044464	1.9074663	0	1
O_COEXP	.8665211	.8665211	.0182292	1.8800191	0	1

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered	Removed	Vars in	Wilks' Lambda	Sig.	Minimum D Squared	Sig.	Between Groups	
1	E_TENIN		1	.82713	.0033	.93225	.0033	0	1
2	O_C_CLAM		2	.75806	.0020	1.42366	.0020	0	1
3	O_PRWKRE		3	.70379	.0014	1.87733	.0014	0	1

Classification function coefficients
(Fisher's linear discriminant functions)

DRS =	0	1
E_TENIN	.4958779	.1871946
O_C_CLAM	-.0418579	.1122058
O_PRWKRE	.2514509	.0676780
(Constant)	-2.3098568	-1.6313577

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr		After Fcn	Wilks' Lambda	Chi-square	df	Sig
					:	0	.703794	15.631	3	.0013
1*	.4209	100.00	100.00	.5442	:					

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
E_TENIN	.80998
O_C_CLAM	-.53881
O_PRWKRE	.49201

Structure matrix:

Pooled within-groups correlations between discriminating variables and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
E_TENIN	.70469
O_PRWKRE	.45942
O_C_CLAM	-.37709
O_COEXP	.28527
O_BUDGET	-.19050
O_CLEXP	.13152
O_CAP_CO	.12502
E_INTRAT	.12011
E_INFL	.02465

Unstandardized canonical discriminant function coefficients

	Func 1
E_TENIN	.2252903
O_C_CLAM	-.1124423
O_PRWKRE	.1341254
(Constant)	-1.3275524

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	.42817
1	-.94198

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
0	3	4.668281
1	3	7.094255
Pooled within-groups covariance matrix	3	8.258191

Box's M	Approximate F	Degrees of freedom		Significance
131.17224	19.91795	6,	4834.4	.0000

Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0		0	.3626	.6177	1	.3823	-.4823
2			0	**	1	.4607	.7615	0	.2385	-1.6797
3			0	**	1	.3677	.7997	0	.2003	-1.8428
4			0	**	1	.5003	.7453	0	.2547	-1.6159
5			0	**	1	.7832	.6288	0	.3712	-1.2171
6			0	**	1	.8700	.5925	0	.4075	-1.1056
7			0		0	.8869	.8724	1	.1276	.5704
8			0		0	.9710	.8553	1	.1447	.4645
9			0		0	.5693	.7206	1	.2794	-.1409
10			0		0	.8131	.8860	1	.1140	.6646
11			0		0	.9266	.8645	1	.1355	.5203
12			0		0	.6210	.9172	1	.0828	.9226
13			0		0	.0420	.9892	1	.0108	2.4617
14			0		0	.9479	.8602	1	.1398	.4935
15			0		0	.7421	.8983	1	.1017	.7572
16			0		0	.1792	.9725	1	.0275	1.7713
17			0		0	.5935	.9212	1	.0788	.9619
18			0		0	.3109	.9575	1	.0425	1.4414
19			0		0	.9217	.8310	1	.1690	.3299
20			0		0	.2720	.9620	1	.0380	1.5267
21			0		0	.4614	.6721	1	.3279	-.3084
22			0		0	.9016	.8695	1	.1305	.5518
23			0		0	.8078	.8870	1	.1130	.6715
24			0		0	.9395	.8619	1	.1381	.5041
25			0		0	.2407	.9656	1	.0344	1.6014
26			0		0	.9501	.8377	1	.1623	.3656
27			0		0	.8556	.8142	1	.1858	.2462
28			0		0	.5806	.9230	1	.0770	.9807
29			0		0	.7636	.8947	1	.1053	.7290
30			0		0	.5606	.9258	1	.0742	1.0101
31			0		0	.6114	.9186	1	.0814	.9363
32			0		0	.2385	.9659	1	.0341	1.6070
33			0		0	.9963	.8499	1	.1501	.4328
34			1		1	.9981	.5367	0	.4633	-.9396
35			1	**	0	.2103	.5027	1	.4973	-.8244
36			1	**	0	.5273	.7029	1	.2971	-.2039
37			1	**	0	.3037	.5788	1	.4212	-.6004
38			1		1	.4826	.7525	0	.2475	-1.6441
39			1		1	.8712	.5920	0	.4080	-1.1041
40			1		1	.2315	.8569	0	.1431	-2.1386
41			1		1	.7832	.6288	0	.3712	-1.2171
42			1		1	.7530	.6414	0	.3586	-1.2567
43			1	**	0	.3309	.5974	1	.4026	-.5442
44			1	**	0	.3462	.6074	1	.3926	-.5138
45			1		1	.9946	.5398	0	.4602	-.9488
46			1	**	0	.9186	.8302	1	.1698	.3260
47			1	**	0	.7814	.8916	1	.1084	.7057
48			1		1	.0224	.9637	0	.0363	-3.2257

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

All-groups Stacked Histogram

Canonical Discriminant Function 1

```
         4 +                                    1 2                      +
           |                                    1 2                      |
           |                                    1 2                      |
 F         |                                    1 2                      |
 r       3 +                         2          1 1  1                   +
 e         |                         2          1 1  1                   |
 q         |                         2          1 1  1                   |
 u         |                         2          1 1  1                   |
 e       2 +              2   22 2   2        21111 11     1             +
 n         |              2   22 2   2        21111 11     1             |
 c         |              2   22 2   2        21111 11     1             |
 y         |              2   22 2   2        21111 11     1             |
         1 +2        2  111  211 22 21 121   111111111   111 1      1    +
           |2        2  111  211 22 21 121   111111111   111 1      1    |
           |2        2  111  211 22 21 121   111111111   111 1      1    |
           |2        2  111  211 22 21 121   111111111   111 1      1    |
           X----------+---------+----------+---------+---------+---------X
         out       -2.0      -1.0         .0       1.0       2.0         out
   Class   222222222222222222222222111111111111111111111111111111111111111
 Centroids                      2             1
```

Classification results -

Actual Group		No. of Cases	Predicted Group Membership 0	1
Group	0	33	28	5
			84.8%	15.2%
Group	1	15	7	8
			46.7%	53.3%

Percent of "grouped" cases correctly classified: 75.00%

Classification processing summary

48 (Unweighted) cases were processed.
0 cases were excluded for missing or out-of-range group codes.
0 cases had at least one missing discriminating variable.
48 (Unweighted) cases were used for printed output.

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

48 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
48 (Unweighted) cases will be used in the analysis.

Number of cases by group

DRS	Number of cases Unweighted	Weighted	Label
0	33	33.0	
1	15	15.0	
Total	48	48.0	

Group means

DRS	E_INFL	E_INTRAT	E_TENIN	P_DESCH
0	.84906	8.29494	6.22148	.09403
1	.82983	8.42073	2.75013	.15580
Total	.84305	8.33425	5.13669	.11333

DRS	P_DESCOM	P_INV_CL	P_NOMIN	P_REL
0	3.00000	4.03030	.25606	2.30303
1	3.00000	3.40000	.17200	3.20000
Total	3.00000	3.83333	.22979	2.58333

DRS	P_SELCRI
0	4.51515
1	4.93333
Total	4.64583

Group standard deviations

DRS	E_INFL	E_INTRAT	E_TENIN	P_DESCH
0	.11503	.72658	3.62562	.06323
1	.10637	1.60452	3.52491	.07283
Total	.11163	1.06291	3.91088	.07169

DRS	P_DESCOM	P_INV_CL	P_NOMIN	P_REL
0	1.27475	1.23705	.21823	1.26206
1	1.19523	1.45406	.28456	1.20712
Total	1.23771	1.32622	.24103	1.30194

DRS	P_SELCRI
0	1.50252
1	.79881
Total	1.32873

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 46 degrees of freedom

Variable	Wilks' Lambda	F	Significance
E_INFL	.99349	.3014	.5857
E_INTRAT	.99693	.1418	.7082
E_TENIN	.82713	9.6139	.0033
P_DESCH	.83709	8.9520	.0044
P_DESCOM	1.00000	.0000	1.0000
P_INV_CL	.95044	2.3986	.1283
P_NOMIN	.97331	1.2613	.2672
P_REL	.89585	5.3477	.0253
P_SELCRI	.97827	1.0219	.3173

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS   DISPUTE RESOLUTION SATISFACTION

Analysis number 1

Stepwise variable selection
Selection rule: maximize minimum Mahalanobis distance (D squared) between groups
Maximum number of steps.................. 18
Minimum tolerance level.................. .00100
Minimum F to enter....................... 1.00000
Maximum F to remove...................... .90000

Canonical Discriminant Functions

Maximum number of functions............. 1
Minimum cumulative percent of variance... 100.00
Maximum significance of Wilks' Lambda.... 1.0000

Prior probabilities

Group	Prior	Label
0	.68750	
1	.31250	
Total	1.00000	

--------------- Variables in the Analysis after Step 5 ---------------

Variable	Tolerance	F to Remove	D Squared	Between Groups	
E_TENIN	.8976240	11.2940	1.7959491	0	1
P_DESCH	.9645002	7.3616	2.2943733	0	1
P_DESCOM	.7755581	1.7993	3.1522196	0	1
P_NOMIN	.8559619	2.7695	2.9872522	0	1
P_REL	.7882337	6.9158	2.3559371	0	1

--------------- Variables not in the Analysis after Step 5 ---------------

Variable	Tolerance	Minimum Tolerance	F to Enter	D Squared	Between Groups	
E_INFL	.8386929	.7208074	.0240809	3.4830221	0	1
E_INTRAT	.9134756	.7502963	.1388948	3.5052539	0	1
P_INV_CL	.9656048	.7696023	.2817225	3.5329101	0	1
P_SELCRI	.9187645	.7656100	.0193730	3.4821105	0	1

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered	Removed	Vars in	Wilks' Lambda	Sig.	Minimum D Squared	Sig.	Between Groups	
1	E_TENIN		1	.82713	.0033	.93225	.0033	0	1
2	P_DESCH		2	.68882	.0002	2.01508	.0002	0	1
3	P_REL		3	.63535	.0002	2.56005	.0002	0	1
4	P_NOMIN		4	.58593	.0001	3.15222	.0001	0	1
5	P_DESCOM		5	.56186	.0001	3.47836	.0001	0	1

Classification function coefficients
(Fisher's linear discriminant functions)

DRS =	0	1
E_TENIN	.6321230	.2513314
P_DESCH	17.0697717	33.7816018
P_DESCOM	1.6798298	1,1614987
P_NOMIN	4.5515270	1.4002056
P_REL	.6346661	1.5926818
(Constant)	-6.9769090	-8.5512915

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr		After Fcn	Wilks' Lambda	Chi-square	df	Sig
				.	:	0	.561862	25.078	5	.0001
1*	.7798	100.00	100.00	.6619	:					

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
E_TENIN	.73406
P_DESCH	-.59407
P_DESCOM	.34770
P_NOMIN	.40614
P_REL	-.63983

Structure matrix:

Pooled within-groups correlations between discriminating variables
and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
E_TENIN	.51770
P_DESCH	-.49956
P_REL	-.38611
P_SELCRI	-.20027
P_NOMIN	.18752
P_INV_CL	.13553
E_INFL	.12520
E_INTRAT	.02117
P_DESCOM	.00000

Unstandardized canonical discriminant function coefficients

	Func 1
E_TENIN	.2041739
P_DESCH	-8.9605939
P_DESCOM	.2779202
P_NOMIN	1.6896840
P_REL	-.5136714
(Constant)	.0717052

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	.58282
1	-1.28221

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
0	5	-5.328530
1	5	-6.496721
Pooled within-groups covariance matrix	5	-5.242273

Box's M	Approximate F	Degrees of freedom		Significance
20.32251	1.15336	15,	3115.6	.3019

Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0	**	1	.6230	.8662	0	.1338	-1.7738
2			0		0	.8840	.9051	1	.0949	.4369
3			0	**	1	.7337	.5784	0	.4216	-.9420
4			0		0	.2559	.6008	1	.3992	-.5533
5			0		0	.4224	.7372	1	.2628	-.2195
6			0	**	1	.7838	.8119	0	.1881	-1.5566
7			0		0	.8064	.9519	1	.0481	.8279
8			0		0	.3126	.9880	1	.0120	1.5925
9			0		0	.9106	.9392	1	.0608	.6952
10			0		0	.4415	.7488	1	.2512	-.1869
11			0		0	.3037	.9884	1	.0116	1.6113
12			0		0	.2579	.9904	1	.0096	1.7143
13			0		0	.6833	.9640	1	.0360	.9908
14			0		0	.8261	.9497	1	.0503	.8025
15			0		0	.1743	.9937	1	.0063	1.9413
16			0		0	.3900	.9842	1	.0158	1.4424
17			0		0	.3479	.9863	1	.0137	1.5215
18			0		0	.7170	.9610	1	.0390	.9453
19			0		0	.7397	.8708	1	.1292	.2506
20			0		0	.8515	.8983	1	.1017	.3956
21			0		0	.5075	.7844	1	.2156	-.0799
22			0		0	.2751	.9897	1	.0103	1.6742
23			0		0	.2134	.5515	1	.4485	-.6616
24			0		0	.2522	.5968	1	.4032	-.5621
25			0		0	.3532	.9861	1	.0139	1.5112
26			0		0	.3269	.9873	1	.0127	1.5632
27			0		0	.7165	.9610	1	.0390	.9459
28			0		0	.3358	.9869	1	.0131	1.5452
29			0		0	.4536	.9806	1	.0194	1.3323
30			0		0	.3933	.7182	1	.2818	-.2709
31			0		0	.2265	.5676	1	.4324	-.6265
32			0		0	.6330	.9683	1	.0317	1.0603
33			0		0	.1995	.9928	1	.0072	1.8658
34			1		1	.7832	.8121	0	.1879	-1.5574
35			1	**	0	.2765	.6220	1	.3780	-.5055
36			1		1	.5313	.8927	0	.1073	-1.9082
37			1		1	.8003	.8057	0	.1943	-1.5351
38			1		1	.2202	.9622	0	.0378	-2.5082
39			1		1	.2735	.9523	0	.0477	-2.3772
40			1		1	.4884	.9040	0	.0960	-1.9751
41			1		1	.8284	.7949	0	.2051	-1.4989
42			1		1	.8400	.7904	0	.2096	-1.4841
43			1		1	.4479	.9142	0	.0858	-2.0412
44			1		1	.8126	.8010	0	.1990	-1.5193
45			1	**	0	.3567	.6918	1	.3082	-.3388
46			1	**	0	.2288	.5703	1	.4297	-.6206
47			1	**	0	.9876	.9240	1	.0760	.5672
48			1	**	0	.6074	.8277	1	.1723	.0691

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

All-groups Stacked Histogram

Canonical Discriminant Function 1

```
       8 +
         |                                      1
  F      |                                      1
  r    6 +                           2          1
  e      |                           2          1
  q      |                           2          1
  u      |                           2          1
  e    4 +                      2    1       1  1
  n      |                      2    1       1  1
  c      |                    2 2    1 1     1  1
  y      |                    2 2    1 1     1  1
       2 +                    2 22   1 12 1211 111
         |                    2 22   1 12 1211 111
         |                 22 2112 1 121111111 1111
         |                 22 2112 1 121111111 1111
          X---------+---------+---------+---------+---------+---------X
        out      -4.0      -2.0         .0      2.0       4.0        out
 Class   22222222222222222222222222221111111111111111111111111111111111
Centroids                         2        1
```

Classification results -

Actual Group		No. of Cases	Predicted Group Membership 0	Predicted Group Membership 1
Group	0	33	30 90.9%	3 9.1%
Group	1	15	5 33.3%	10 66.7%

Percent of "grouped" cases correctly classified: 83.33%

Classification processing summary

48 (Unweighted) cases were processed.
0 cases were excluded for missing or out-of-range group codes.
0 cases had at least one missing discriminating variable.
48 (Unweighted) cases were used for printed output.

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

48 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
48 (Unweighted) cases will be used in the analysis.

Number of cases by group

DRS	Number of cases Unweighted	Weighted	Label
0	33	33.0	
1	15	15.0	
Total	48	48.0	

Group means

DRS	E_INFL	E_INTRAT	E_TENIN	R_ADR
0	.84906	8.29494	6.22148	2.72727
1	.82983	8.42073	2.75013	3.66667
Total	.84305	8.33425	5.13669	3.02083

DRS	R_ADV_CL	R_ADV_CO	R_EQUAB	R_FUT_CL
0	1.24242	1.48485	3.00000	3.54545
1	2.13333	3.40000	2.86667	4.06667
Total	1.52083	2.08333	2.95833	3.70833

DRS	R_FUT_CO	R_INC_CL	R_INC_CO	R_MAN_CL
0	3.48485	2.06061	2.00000	3.09091
1	4.80000	3.60000	3.06667	4.66667
Total	3.89583	2.54167	2.33333	3.58333

DRS	R_MAN_CO	R_NEG_CL
0	3.03030	2.39394
1	2.53333	3.00000
Total	2.87500	2.58333

Group standard deviations

DRS	E_INFL	E_INTRAT	E_TENIN	R_ADR
0	.11503	.72658	3.62562	1.82470
1	.10637	1.60452	3.52491	2.05866
Total	.11163	1.06291	3.91088	1.92950

DRS	R_ADV_CL	R_ADV_CO	R_EQUAB	R_FUT_CL
0	.79177	1.27772	1.73205	1.71557
1	1.80739	2.02837	1.72654	1.66762
Total	1.25460	1.77252	1.71301	1.70054

DRS	R_FUT_CO	R_INC_CL	R_INC_CO	R_MAN_CL
0	1.62252	1.27327	1.11803	1.56851
1	1.26491	1.80476	1.79151	1.29099
Total	1.62742	1.61058	1.43413	1.64812

DRS	R_MAN_CO	R_NEG_CL
0	1.53062	1.22320
1	1.24595	1.41421
Total	1.45317	1.30194

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 46 degrees of freedom

Variable	Wilks' Lambda	F	Significance
E_INFL	.99349	.3014	.5857
E_INTRAT	.99693	.1418	.7082
E_TENIN	.82713	9.6139	.0033
R_ADR	.94799	2.5236	.1190
R_ADV_CL	.88936	5.7227	.0209
R_ADV_CO	.74385	15.8401	.0002
R_EQUAB	.99867	.0612	.8057
R_FUT_CL	.97939	.9681	.3303
R_FUT_CO	.85671	7.6938	.0080
R_INC_CL	.79955	11.5322	.0014
R_INC_CO	.87862	6.3548	.0152
R_MAN_CL	.79943	11.5410	.0014
R_MAN_CO	.97434	1.2116	.2768
R_NEG_CL	.95245	2.2963	.1365

-------- D I S C R I M I N A N T   A N A L Y S I S --------

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

Analysis number 1

Stepwise variable selection
Selection rule: maximize minimum Mahalanobis distance (D squared) between groups
Maximum number of steps.................. 28
Minimum tolerance level.................. .00100
Minimum F to enter....................... 1.00000
Maximum F to remove...................... .90000

Canonical Discriminant Functions

Maximum number of functions.............. 1
Minimum cumulative percent of variance... 100.00
Maximum significance of Wilks' Lambda.... 1.0000

Prior probabilities

Group	Prior	Label
0	.68750	
1	.31250	
Total	1.00000	

---------------- Variables in the Analysis after Step 7 ----------------

Variable	Tolerance	F to Remove	D Squared	Between Groups	
E_INTRAT	.8599668	2.7508	5.0639925	0	1
E_TENIN	.8794329	4.9701	4.5939590	0	1
R_ADV_CL	.9015152	2.1806	5.1927441	0	1
R_ADV_CO	.7703387	1.5070	5.3494008	0	1
R_FUT_CO	.7578756	1.1498	5.4345688	0	1
R_INC_CL	.6013868	3.7586	4.8446451	0	1
R_MAN_CL	.9080899	6.1472	4.3629946	0	1

---------------- Variables not in the Analysis after Step 7 ----------------

Variable	Tolerance	Minimum Tolerance	F to Enter	D Squared	Between Groups	
E_INFL	.6841973	.4736312	.9253607	5.9605362	0	1
R_ADR	.7940879	.5989445	.3383261	5.8073110	0	1
R_EQUAB	.9358394	.5985843	.0388263	5.7291369	0	1
R_FUT_CL	.4157613	.3784484	.0001025	5.7190294	0	1
R_INC_CO	.5331201	.4429602	.0586574	5.7343131	0	1
R_MAN_CO	.8243325	.6010736	.0503543	5.7321459	0	1
R_NEG_CL	.7482109	.5996225	.0546658	5.7332713	0	1

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered Removed	Vars in	Wilks' Lambda	Sig.	Minimum D Squared	Sig.	Between Groups	
1	R_ADV_CO	1	.74385	.0002	1.53601	.0002	0	1
2	R_FUT_CO	2	.63947	.0000	2.51486	.0000	0	1
3	R_MAN_CL	3	.55512	.0000	3.57485	.0000	0	1
4	E_TENIN	4	.51582	.0000	4.18696	.0000	0	1
5	E_INTRAT	5	.49231	.0000	4.60000	.0000	0	1
6	R_INC_CL	6	.46208	.0000	5.19274	.0000	0	1
7	R_ADV_CL	7	.43819	.0000	5.71900	.0000	0	1

Classification function coefficients
(Fisher's linear discriminant functions)

DRS =	0	1
E_INTRAT	8.6907802	9.5043343
E_TENIN	.0471514	-.2674438
R_ADV_CL	.4118019	1.0506521
R_ADV_CO	.8705533	1.3188030
R_FUT_CO	1.4318837	1.8342351
R_INC_CL	2.0793680	2.9076752
R_MAN_CL	2.4415670	3.2619498
(Constant)	-45.8789119	-61.4219868

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr		After Fcn	Wilks' Lambda	Chi-square	df	Sig
					:	0	.438190	35.067	7	.0000
1*	1.2821	100.00	100.00	.7495	:					

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
E_INTRAT	.36494
E_TENIN	-.47296
R_ADV_CL	.31949
R_ADV_CO	.28965
R_FUT_CO	.25617
R_INC_CL	.50421
R_MAN_CL	.51098

Structure matrix:

Pooled within-groups correlations between discriminating variables
and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
R_ADV_CO	.51825
R_MAN_CL	.44236
R_INC_CL	.44219
E_TENIN	-.40374
R_INC_CO	.36603
R_FUT_CO	.36118
R_ADV_CL	.31150
E_INFL	-.24148
R_NEG_CL	.24053
R_FUT_CL	.12952
R_MAN_CO	-.09980
R_ADR	.09612
R_EQUAB	-.07294
E_INTRAT	.04903

Unstandardized canonical discriminant function coefficients

	Func 1
E_INTRAT	.3401937
E_TENIN	-.1315503
R_ADV_CL	.2671400
R_ADV_CO	.1874390
R_FUT_CO	.1682462
R_INC_CL	.3463628
R_MAN_CL	.3430492
(Constant)	-5.7213578

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	-.74733
1	1.64412

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
0	7	3.166786
1	7	6.557924
Pooled within-groups covariance matrix	7	5.617929

Box's M	Approximate F	Degrees of freedom		Significance
65.27664	1.84380	28,	2761.8	.0045

Case Number	Mis Val	Sel	Actual Group	Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0 **	1	.4478	.5636	0	.4364	.8851
2			0 **	1	.4399	.5557	0	.4443	.8717
3			0	0	.2801	.7436	1	.2564	.3328
4			0	0	.3730	.8202	1	.1798	.1436
5			0	0	.9056	.9666	1	.0334	-.6287
6			0	0	.9981	.9748	1	.0252	-.7497
7			0	0	.2859	.9980	1	.0020	-1.8145
8			0	0	.6672	.9908	1	.0092	-1.1773
9			0	0	.6161	.9205	1	.0795	-.2460
10			0	0	.6350	.9917	1	.0083	-1.2220
11			0	0	.5578	.9936	1	.0064	-1.3335
12			0	0	.8512	.9836	1	.0164	-.9349
13			0	0	.2139	.9987	1	.0013	-1.9903
14			0	0	.4773	.9953	1	.0047	-1.4580
15			0	0	.1450	.9992	1	.0008	-2.2047
16			0	0	.6164	.9922	1	.0078	-1.2482
17			0	0	.0750	.9996	1	.0004	-2.5276
18			0	0	.5982	.9159	1	.0841	-.2203
19			0	0	.2692	.7322	1	.2678	.3576
20			0	0	.4713	.9954	1	.0046	-1.4677
21			0	0	.2050	.9987	1	.0013	-2.0147
22			0	0	.2957	.9979	1	.0021	-1.7931
23			0	0	.5018	.8851	1	.1149	-.0757
24			0	0	.4812	.8769	1	.1231	-.0429
25			0	0	.3579	.9971	1	.0029	-1.6666
26			0	0	.2535	.7145	1	.2855	.3945
27			0	0	.2422	.9984	1	.0016	-1.9169
28			0	0	.3506	.8047	1	.1953	.1861
29			0	0	.8556	.9613	1	.0387	-.5653
30			0	0	.9048	.9808	1	.0192	-.8670
31			0	0	.8979	.9658	1	.0342	-.6190
32			0	0	.8499	.9607	1	.0393	-.5580
33			0 **	1	.8930	.8519	0	.1481	1.5096
34			1	1	.7751	.9402	0	.0598	1.9299
35			1	1	.5933	.9660	0	.0340	2.1782
36			1	1	.5291	.6378	0	.3622	1.0148
37			1 **	0	.8299	.9583	1	.0417	-.5326
38			1	1	.4012	.9834	0	.0166	2.4837
39			1	1	.5020	.9753	0	.0247	2.3155
40			1	1	.1912	.9945	0	.0055	2.9511
41			1	1	.8799	.8468	0	.1532	1.4931
42			1	1	.1060	.9974	0	.0026	3.2606
43			1 **	0	.1491	.5493	1	.4507	.6954
44			1	1	.8918	.8514	0	.1486	1.5080
45			1	1	.5781	.9677	0	.0323	2.2003
46			1	1	.6095	.7005	0	.2995	1.1334
47			1	1	.8726	.8439	0	.1561	1.4838
48			1 **	0	.1957	.6350	1	.3650	.5466

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

```
                All-groups Stacked Histogram

               Canonical Discriminant Function 1

     8 +                                                            +
       |                                                            |
  F    |                                                            |
  r    |                                                            |
  e  6 +                                                            +
  q    |                           2                                |
  u    |                           2                                |
  e  4 +                           1                                +
  n    |                           1                                |
  c    |                  1  11    1    1                           |
  y    |                  1  11    1    1                           |
     2 +                 11  11   11  111121    22   22             +
       |                 11  11   11  111121    22   22             |
       |              1 111111111 1111212221   222   22             |
       |              1 111111111 1111212221   222   22             |
       X---------+---------+---------+---------+---------+---------X
      out      -4.0      -2.0        .0       2.0       4.0       out
  Class   1111111111111111111111111111111111111122222222222222222222222222
  Centroids                           1           2
```

Classification results -

Actual Group		No. of Cases	Predicted Group Membership 0	1
Group	0	33	30 90.9%	3 9.1%
Group	1	15	3 20.0%	12 80.0%

Percent of "grouped" cases correctly classified: 87.50%

Classification processing summary

48 (Unweighted) cases were processed.
0 cases were excluded for missing or out-of-range group codes.
0 cases had at least one missing discriminating variable.
48 (Unweighted) cases were used for printed output.

-------- D I S C R I M I N A N T   A N A L Y S I S --------

On groups defined by DRS   DISPUTE RESOLUTION SATISFACTION

48 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
48 (Unweighted) cases will be used in the analysis.

Number of cases by group

DRS	Number of cases Unweighted	Weighted	Label
0	33	33.0	
1	15	15.0	
Total	48	48.0	

Group means

DRS	O_BUDGET	O_C_CLAM	O_CAP_CO	O_CLEXP
0	1.10140	.71864	.85000	7.15152
1	1.11280	3.19447	.86333	7.06667
Total	1.10496	1.49233	.85417	7.12500

DRS	O_COEXP	O_PRWKRE	P_DESCH	P_DESCOM
0	3.84848	3.24242	.09403	3.00000
1	2.60000	.93333	.15580	3.00000
Total	3.45833	2.52083	.11333	3.00000

DRS	P_INV_CL	P_NOMIN	P_REL	P_SELCRI
0	4.03030	.25606	2.30303	4.51515
1	3.40000	.17200	3.20000	4.93333
Total	3.83333	.22979	2.58333	4.64583

Group standard deviations

DRS	O_BUDGET	O_C_CLAM	O_CAP_CO	O_CLEXP
0	.15225	.73667	.26041	7.04504
1	.14299	8.61436	.23939	6.83966
Total	.14799	4.88044	.25156	6.90860

DRS	O_COEXP	O_PRWKRE	P_DESCH	P_DESCOM
0	2.98037	4.30138	.06323	1.27475
1	2.50143	1.38701	.07283	1.19523
Total	2.87290	3.78682	.07169	1.23771

DRS	P_INV_CL	P_NOMIN	P_REL	P_SELCRI
0	1.23705	.21823	1.26206	1.50252
1	1.45406	.28456	1.20712	.79881
Total	1.32622	.24103	1.30194	1.32873

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 46 degrees of freedom

Variable	Wilks' Lambda	F	Significance
O_BUDGET	.99870	.0599	.8077
O_C_CLAM	.94353	2.7529	.1039
O_CAP_CO	.99938	.0284	.8670
O_CLEXP	.99997	.0015	.9690
O_COEXP	.95856	1.9885	.1652
O_PRWKRE	.91842	4.0862	.0491
P_DESCH	.83709	8.9520	.0044
P_DESCOM	1.00000	.0000	1.0000
P_INV_CL	.95044	2.3986	.1283
P_NOMIN	.97331	1.2613	.2672
P_REL	.89585	5.3477	.0253
P_SELCRI	.97827	1.0219	.3173

-------- D I S C R I M I N A N T   A N A L Y S I S --------

On groups defined by DRS   DISPUTE RESOLUTION SATISFACTION

Analysis number 1

Stepwise variable selection
Selection rule: maximize minimum Mahalanobis distance (D squared) between groups
Maximum number of steps.................. 24
Minimum tolerance level.................. .00100
Minimum F to enter....................... 1.00000
Maximum F to remove...................... .90000

Canonical Discriminant Functions

Maximum number of functions.............. 1
Minimum cumulative percent of variance... 100.00
Maximum significance of Wilks' Lambda.... 1.0000

Prior probabilities

Group	Prior	Label
0	.68750	
1	.31250	
Total	1.00000	

---------------- Variables in the Analysis after Step 8 ----------------

Variable	Tolerance	F to Remove	D Squared	Between Groups	
O_C_CLAM	.8707990	4.3048	2.1452116	0	1
O_CLEXP	.7692827	3.4593	2.2708422	0	1
O_COEXP	.8306092	3.3529	2.2869901	0	1
P_DESCH	.9294039	5.1444	2.0250157	0	1
P_INV_CL	.7463946	4.1562	2.1669516	0	1
P_REL	.9221233	5.5726	1.9653835	0	1

---------------- Variables not in the Analysis after Step 8 ----------------

Variable	Tolerance	Minimum Tolerance	F to Enter	D Squared	Between Groups	
O_BUDGET	.6849009	.6721421	.2331169	2.8813293	0	1
O_CAP_CO	.7864919	.7070656	.2431320	2.8831569	0	1
O_PRWKRE	.6637175	.6637175	.3445392	2.9016622	0	1
P_DESCOM	.7760490	.7392906	.6968937	2.9659615	0	1
P_NOMIN	.8978435	.7445888	.4760345	2.9256581	0	1
P_SELCRI	.7965541	.6675940	.0002975	2.8388433	0	1

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered	Action Removed	Vars in	Wilks' Lambda	Sig.	Minimum D Squared	Sig.	Between Groups	
1	P_DESCH		1	.83709	.0044	.86807	.0044	0	1
2	P_REL		2	.75583	.0018	1.44098	.0018	0	1
3	O_C_CLAM		3	.71809	.0021	1.75113	.0021	0	1
4	O_PRWKRE		4	.69206	.0028	1.98483	.0028	0	1
5	O_CLEXP		5	.66305	.0031	2.26683	.0031	0	1
6	P_INV_CL		6	.63238	.0032	2.59305	.0032	0	1
7	O_COEXP		7	.60587	.0035	2.90166	.0035	0	1
8		O_PRWKRE	6	.61109	.0017	2.83879	.0017	0	1

Classification function coefficients
(Fisher's linear discriminant functions)

DRS =	0	1
O_C_CLAM	-.1302289	.0560144
O_CLEXP	.0301436	.1531870
O_COEXP	.8917505	.6050744
P_DESCH	32.6289834	46.7430242
P_INV_CL	3.3206883	2.5947508
P_REL	1.8141370	2.5954687
(Constant)	-12.4663831	-14.7855840

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr		After Fcn	Wilks' Lambda	Chi-square	df	Sig
					:	0	.611093	21.178	6	.0017
1*	.6364	100.00	100.00	.6236	:					

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
O_C_CLAM	.52969
O_CLEXP	.50997
O_COEXP	-.48376
P_DESCH	.55537
P_INV_CL	-.56309
P_REL	.57763

Structure matrix:

Pooled within-groups correlations between discriminating variables
and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
P_DESCH	.55298
P_REL	.42740
O_C_CLAM	.30665
P_INV_CL	-.28624
O_COEXP	-.26063
O_PRWKRE	-.25236
P_SELCRI	.19074
P_DESCOM	.18646
O_CAP_CO	-.07974
O_BUDGET	-.05606
P_NOMIN	-.04181
O_CLEXP	-.00721

Unstandardized canonical discriminant function coefficients

	Func 1
O_C_CLAM	.1105386
O_CLEXP	.0730284
O_COEXP	-.1701472
P_DESCH	8.3769286
P_INV_CL	-.4308565
P_REL	.4637340
(Constant)	-.5926097

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	-.52652
1	1.15835

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
0	6	.158967
1	6	4.820223
Pooled within-groups covariance matrix	6	4.173995

Box's M	Approximate F	Degrees of freedom		Significance
119.43370	4.67055	21,	2890.8	.0000

Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0	**	1	.4742	.8626	0	.1374	1.8740
2			0		0	.6322	.9532	1	.0468	-1.0051
3			0		0	.9667	.9071	1	.0929	-.5683
4			0		0	.4666	.9688	1	.0312	-1.2545
5			0		0	.8642	.9239	1	.0761	-.6975
6			0		0	.4759	.7323	1	.2677	.1865
7			0		0	.2306	.9856	1	.0144	-1.7253
8			0		0	.3123	.9804	1	.0196	-1.5369
9			0		0	.5430	.9620	1	.0380	-1.1348
10			0		0	.6279	.8008	1	.1992	-.0418
11			0		0	.1690	.9893	1	.0107	-1.9019
12			0		0	.9454	.8902	1	.1098	-.4581
13			0		0	.4871	.9670	1	.0330	-1.2215
14			0		0	.6756	.8180	1	.1820	-.1080
15			0		0	.4196	.9726	1	.0274	-1.3336
16			0		0	.1706	.9892	1	.0108	-1.8969
17			0		0	.4565	.9696	1	.0304	-1.2711
18			0		0	.2222	.5377	1	.4623	.6941
19			0		0	.7044	.8276	1	.1724	-.1471
20			0		0	.7958	.9336	1	.0664	-.7853
21			0		0	.3539	.6561	1	.3439	.4005
22			0		0	.7764	.8493	1	.1507	-.2426
23			0		0	.2005	.5128	1	.4872	.7536
24			0	**	1	.7382	.5169	0	.4831	.8240
25			0		0	.9082	.8822	1	.1178	-.4112
26			0		0	.5899	.7858	1	.2142	.0125
27			0		0	.6463	.8076	1	.1924	-.0676
28			0		0	.4787	.9677	1	.0323	-1.2349
29			0		0	.2994	.9812	1	.0188	-1.5643
30			0	**	1	.7815	.7499	0	.2501	1.4357
31			0		0	.4815	.7353	1	.2647	.1773
32			0		0	.3484	.9779	1	.0221	-1.4642
33			0		0	.2566	.9840	1	.0160	-1.6609
34			1		1	.6596	.7979	0	.2021	1.5988
35			1		1	.9562	.6734	0	.3266	1.2133
36			1		1	.5025	.8533	0	.1467	1.8289
37			1		1	.5307	.8439	0	.1561	1.7852
38			1		1	.5239	.8462	0	.1538	1.7957
39			1		1	.9351	.6210	0	.3790	1.0769
40			1		1	.9457	.6263	0	.3737	1.0903
41			1		1	.4028	.8850	0	.1150	1.9949
42			1	**	0	.4452	.7153	1	.2847	.2370
43			1	**	0	.2979	.6116	1	.3884	.5144
44			1		1	.2958	.9162	0	.0838	2.2038
45			1	**	0	.3940	.6839	1	.3161	.3258
46			1	**	0	.7026	.8270	1	.1730	-.1447
47			1	**	0	.5420	.9621	1	.0379	-1.1363
48			1		1	.0668	.9763	0	.0237	2.9912

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

All-groups Stacked Histogram

Canonical Discriminant Function 1

```
      8 +                                                              +
        |                                                              |
  F     |                                                              |
  r   6 +                        2                                     +
  e     |                        2                                     |
  q     |                        1                                     |
  u     |                        1                                     |
  e   4 +                        1    2         2                      +
  n     |                        1    2         2                      |
  c     |                      1 1    112       2                      |
  y     |                      1 1    112       2                      |
      2 +                     1111  111112212   2                      +
        |                     1111  111112212   2                      |
        |                    111111111111111112212122   2              |
        |                    111111111111111112212122   2              |
        X---------+---------+---------+---------+---------+---------X
       out      -4.0      -2.0        .0       2.0       4.0       out
  Class   111111111111111111111111111111111111112222222222222222222222222222
  Centroids                             1       2
```

Classification results -

Actual Group		No. of Cases	Predicted Group Membership 0	1
Group	0	33	30 90.9%	3 9.1%
Group	1	15	5 33.3%	10 66.7%

Percent of "grouped" cases correctly classified: 83.33%

Classification processing summary

48 (Unweighted) cases were processed.
0 cases were excluded for missing or out-of-range group codes.
0 cases had at least one missing discriminating variable.
48 (Unweighted) cases were used for printed output.

- - - - - - - - D I S C R I M I N A N T A N A L Y S I S - - - - - - - -

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

48 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
48 (Unweighted) cases will be used in the analysis.

Number of cases by group

DRS	Number of cases Unweighted	Weighted	Label
0	33	33.0	
1	15	15.0	
Total	48	48.0	

Group means

DRS	O_BUDGET	O_C_CLAM	O_CAP_CO	O_CLEXP
0	1.10140	.71864	.85000	7.15152
1	1.11280	3.19447	.86333	7.06667
Total	1.10496	1.49233	.85417	7.12500

DRS	O_COEXP	O_PRWKRE	R_ADR	R_ADV_CL
0	3.84848	3.24242	2.72727	1.24242
1	2.60000	.93333	3.66667	2.13333
Total	3.45833	2.52083	3.02083	1.52083

DRS	R_ADV_CO	R_EQUAB	R_FUT_CL	R_FUT_CO
0	1.48485	3.00000	3.54545	3.48485
1	3.40000	2.86667	4.06667	4.80000
Total	2.08333	2.95833	3.70833	3.89583

DRS	R_INC_CL	R_INC_CO	R_MAN_CL	R_MAN_CO
0	2.06061	2.00000	3.09091	3.03030
1	3.60000	3.06667	4.66667	2.53333
Total	2.54167	2.33333	3.58333	2.87500

DRS	R_NEG_CL
0	2.39394
1	3.00000
Total	2.58333

Group standard deviations

DRS	O_BUDGET	O_C_CLAM	O_CAP_CO	O_CLEXP
0	.15225	.73667	.26041	7.04504
1	.14299	8.61436	.23939	6.83966
Total	.14799	4.88044	.25156	6.90860

DRS	O_COEXP	O_PRWKRE	R_ADR	R_ADV_CL
0	2.98037	4.30138	1.82470	.79177
1	2.50143	1.38701	2.05866	1.80739
Total	2.87290	3.78682	1.92950	1.25460

DRS	R_ADV_CO	R_EQUAB	R_FUT_CL	R_FUT_CO
0	1.27772	1.73205	1.71557	1.62252
1	2.02837	1.72654	1.66762	1.26491
Total	1.77252	1.71301	1.70054	1.62742

DRS	R_INC_CL	R_INC_CO	R_MAN_CL	R_MAN_CO
0	1.27327	1.11803	1.56851	1.53062
1	1.80476	1.79151	1.29099	1.24595
Total	1.61058	1.43413	1.64812	1.45317

DRS	R_NEG_CL
0	1.22320
1	1.41421
Total	1.30194

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 46 degrees of freedom

Variable	Wilks' Lambda	F	Significance
O_BUDGET	.99870	.0599	.8077
O_C_CLAM	.94353	2.7529	.1039
O_CAP_CO	.99938	.0284	.8670
O_CLEXP	.99997	.0015	.9690
O_COEXP	.95856	1.9885	.1652
O_PRWKRE	.91842	4.0862	.0491
R_ADR	.94799	2.5236	.1190
R_ADV_CL	.88936	5.7227	.0209
R_ADV_CO	.74385	15.8401	.0002
R_EQUAB	.99867	.0612	.8057
R_FUT_CL	.97939	.9681	.3303
R_FUT_CO	.85671	7.6938	.0080
R_INC_CL	.79955	11.5322	.0014
R_INC_CO	.87862	6.3548	.0152
R_MAN_CL	.79943	11.5410	.0014
R_MAN_CO	.97434	1.2116	.2768
R_NEG_CL	.95245	2.2963	.1365

-------- D I S C R I M I N A N T   A N A L Y S I S --------

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

Analysis number 1

Stepwise variable selection
Selection rule: maximize minimum Mahalanobis distance (D squared) between groups

```
Maximum number of steps..................     34
Minimum tolerance level..................  .00100
Minimum F to enter....................... 1.00000
Maximum F to remove......................  .90000
```

Canonical Discriminant Functions

```
Maximum number of functions..............      1
Minimum cumulative percent of variance... 100.00
Maximum significance of Wilks' Lambda.... 1.0000
```

Prior probabilities

Group	Prior	Label
0	.68750	
1	.31250	
Total	1.00000	

---------------- Variables in the Analysis after Step 12 ----------------

Variable	Tolerance	F to Remove	D Squared	Between Groups	
O_C_CLAM	.8653120	4.8079	5.7900830	0	1
O_CLEXP	.6692908	9.4248	4.8127823	0	1
O_COEXP	.8435865	5.7847	5.5665237	0	1
R_ADV_CL	.8213413	4.2551	5.9211022	0	1
R_FUT_CL	.4112759	2.3656	6.3953060	0	1
R_FUT_CO	.3935918	3.3187	6.1508228	0	1
R_INC_CL	.6255474	13.6068	4.0755881	0	1
R_MAN_CL	.8379523	9.9186	4.7191587	0	1

---------------- Variables not in the Analysis after Step 12 ----------------

Variable	Tolerance	Minimum Tolerance	F to Enter	D Squared	Between Groups	
O_BUDGET	.7468207	.3884294	.0686383	7.0745923	0	1
O_CAP_CO	.7659262	.3870792	.1378089	7.0955517	0	1
O_PRWKRE	.7671466	.3916864	.0319453	7.0634739	0	1
R_ADR	.5445288	.2832295	.0586305	7.0715598	0	1
R_ADV_CO	.7458740	.3929268	.4643991	7.1945119	0	1
R_EQUAB	.9607279	.3906730	.0513324	7.0693484	0	1
R_INC_CO	.6278041	.3616490	.0954769	7.0827246	0	1
R_MAN_CO	.8616742	.3888796	.0094159	7.0566473	0	1
R_NEG_CL	.8262257	.3913630	.3469880	7.1589352	0	1

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered	Action Removed	Vars in	Wilks' Lambda	Sig.	Minimum D Squared	Sig.	Between Groups	
1	R_ADV_CO		1	.74385	.0002	1.53601	.0002	0	1
2	R_FUT_CO		2	.63947	.0000	2.51486	.0000	0	1
3	R_MAN_CL		3	.55512	.0000	3.57485	.0000	0	1
4	O_COEXP		4	.52379	.0000	4.05539	.0000	0	1
5	R_INC_CO		5	.49691	.0000	4.51606	.0000	0	1
6	O_CLEXP		6	.45935	.0000	5.25006	.0000	0	1
7	O_C_CLAM		7	.44555	.0000	5.55078	.0000	0	1
8	R_INC_CL		8	.42421	.0000	6.05453	.0000	0	1
9	R_ADV_CL		9	.39560	.0000	6.81500	.0000	0	1
10		R_INC_CO	8	.40086	.0000	6.66685	.0000	0	1
11	R_FUT_CL		9	.38272	.0000	7.19451	.0000	0	1
12		R_ADV_CO	8	.38739	.0000	7.05379	.0000	0	1

Classification function coefficients
(Fisher's linear discriminant functions)

DRS =	0	1
O_C_CLAM	.1522757	.4044667
O_CLEXP	.4405807	.7026173
O_COEXP	.1025216	-.3644921
R_ADV_CL	1.5176780	2.4996068
R_FUT_CL	.2722160	-.4716119
R_FUT_CO	1.4713241	2.4661060
R_INC_CL	1.2660530	2.7649476
R_MAN_CL	2.0752107	3.1958084
(Constant)	-10.7026925	-23.8776691

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr		After Fcn	Wilks' Lambda	Chi-square	df	Sig
					:	0	.387394	39.829	8	.0000
1*	1.5814	100.00	100.00	.7827	:					

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
O_C_CLAM	.45502
O_CLEXP	.68897
O_COEXP	-.49994
R_ADV_CL	.44216
R_FUT_CL	-.47643
R_FUT_CO	.57030
R_INC_CL	.82155
R_MAN_CL	.62848

Structure matrix:

Pooled within-groups correlations between discriminating variables
and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
R_MAN_CL	.39832
R_INC_CL	.39816
R_ADV_CO	.34466
R_FUT_CO	.32522
R_ADV_CL	.28048
O_PRWKRE	-.26946
R_INC_CO	.24482
O_C_CLAM	.19454
O_COEXP	-.16534
R_ADR	.14923
R_FUT_CL	.11536
R_MAN_CO	-.11039
O_CAP_CO	.08709
O_BUDGET	.07563
R_NEG_CL	.06670
R_EQUAB	.01701
O_CLEXP	-.00457

Unstandardized canonical discriminant function coefficients

	Func 1
O_C_CLAM	.0949551
O_CLEXP	.0986621
O_COEXP	-.1758402
R_ADV_CL	.3697163
R_FUT_CL	-.2800665
R_FUT_CO	.3745557
R_INC_CL	.5643645
R_MAN_CL	.4219280
(Constant)	-4.1657974

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	-.82997
1	1.82593

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
0	8	4.795416
1	8	11.938963
Pooled within-groups covariance matrix	8	11.292357

Box's M	Approximate F	Degrees of freedom		Significance
198.84962	4.19925	36,	2680.2	.0000

Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0		0	.4714	.9170	1	.0830	-.1098
2			0		0	.7925	.9738	1	.0262	-.5669
3			0		0	.8466	.9921	1	.0079	-1.0235
4			0		0	.8472	.9782	1	.0218	-.6373
5			0		0	.9905	.9864	1	.0136	-.8181
6			0		0	.3967	.9986	1	.0014	-1.6776
7			0		0	.1757	.9996	1	.0004	-2.1842
8			0		0	.2532	.7826	1	.2174	.3126
9			0		0	.4426	.9069	1	.0931	-.0621
10			0		0	.7023	.9952	1	.0048	-1.2122
11			0		0	.4757	.9980	1	.0020	-1.5432
12			0		0	.6269	.9963	1	.0037	-1.3161
13			0		0	.4341	.9983	1	.0017	-1.6121
14			0		0	.7020	.9952	1	.0048	-1.2126
15			0		0	.5986	.9967	1	.0033	-1.3563
16			0		0	.9912	.9872	1	.0128	-.8410
17			0		0	.2057	.9995	1	.0005	-2.0954
18			0		0	.1972	.7089	1	.2911	.4597
19			0		0	.9144	.9901	1	.0099	-.9375
20			0		0	.1723	.9996	1	.0004	-2.1949
21			0		0	.8510	.9920	1	.0080	-1.0178
22			0		0	.1332	.9998	1	.0002	-2.3318
23			0		0	.1551	.6316	1	.3684	.5919
24			0		0	.6943	.9634	1	.0366	-.4370
25			0		0	.4993	.9978	1	.0022	-1.5056
26			0	**	1	.8639	.9075	0	.0925	1.6545
27			0		0	.5591	.9407	1	.0593	-.2458
28			0		0	.2346	.7611	1	.2389	.3586
29			0		0	.6808	.9617	1	.0383	-.4185
30			0		0	.9725	.9880	1	.0120	-.8645
31			0		0	.6538	.9960	1	.0040	-1.2784
32			0		0	.3775	.9987	1	.0013	-1.7125
33			0		0	.2018	.7162	1	.2838	.4463
34			1	**	0	.2982	.8253	1	.1747	.2104
35			1		1	.4254	.6506	0	.3494	1.0288
36			1		1	.8471	.9627	0	.0373	2.0188
37			1	**	0	.7758	.9723	1	.0277	-.5451
38			1		1	.9461	.9487	0	.0513	1.8935
39			1		1	.9899	.9373	0	.0627	1.8132
40			1		1	.2572	.9968	0	.0032	2.9589
41			1		1	.5978	.7920	0	.2080	1.2984
42			1		1	.1882	.9980	0	.0020	3.1418
43			1		1	.5524	.7614	0	.2386	1.2318
44			1		1	.4779	.9903	0	.0097	2.5356
45			1		1	.1117	.9991	0	.0009	3.4164
46			1		1	.4769	.7004	0	.2996	1.1146
47			1		1	.8552	.9617	0	.0383	2.0084
48			1		1	.1505	.9986	0	.0014	3.2636

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

All-groups Stacked Histogram

```
                  Canonical Discriminant Function 1
      4 +                     1         1                           +
        |                     1         1                           |
        |                     1         1                           |
F       |                     1         1                           |
r     3 +                     1 1112    1    2                      +
e       |                     1 1112    1    2                      |
q       |                     1 1112    1    2                      |
u       |                     1 1112    1    2                      |
e     2 +                  1  11111111  1    2  22      2           +
n       |                  1  11111111  1    2  22      2           |
c       |                  1  11111111  1    2  22      2           |
y       |                  1  11111111  1    2  22      2           |
      1 +                 111111111111111211 22 122  2 222          +
        |                 111111111111111211 22 122  2 222          |
        |                 111111111111111211 22 122  2 222          |
        |                 111111111111111211 22 122  2 222          |
        X---------+---------+---------+---------+---------+---------X
       out      -4.0      -2.0        .0       2.0       4.0       out
  Class 1111111111111111111111111111111111122222222222222222222222222
Centroids                         1             2
```

Classification results -

Actual Group		No. of Cases	Predicted Group Membership 0	1
Group	0	33	32 97.0%	1 3.0%
Group	1	15	2 13.3%	13 86.7%

Percent of "grouped" cases correctly classified: 93.75%

Classification processing summary

48 (Unweighted) cases were processed.
0 cases were excluded for missing or out-of-range group codes.
0 cases had at least one missing discriminating variable.
48 (Unweighted) cases were used for printed output.

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

48 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
48 (Unweighted) cases will be used in the analysis.

Number of cases by group

DRS	Number of cases Unweighted	Weighted	Label
0	33	33.0	
1	15	15.0	
Total	48	48.0	

Group means

DRS	R_ADR	R_ADV_CL	R_ADV_CO	R_EQUAB
0	2.72727	1.24242	1.48485	3.00000
1	3.66667	2.13333	3.40000	2.86667
Total	3.02083	1.52083	2.08333	2.95833

DRS	R_FUT_CL	R_FUT_CO	R_INC_CL	R_INC_CO
0	3.54545	3.48485	2.06061	2.00000
1	4.06667	4.80000	3.60000	3.06667
Total	3.70833	3.89583	2.54167	2.33333

DRS	R_MAN_CL	R_MAN_CO	R_NEG_CL	P_DESCH
0	3.09091	3.03030	2.39394	.09403
1	4.66667	2.53333	3.00000	.15580
Total	3.58333	2.87500	2.58333	.11333

DRS	P_DESCOM	P_INV_CL	P_NOMIN	P_REL
0	3.00000	4.03030	.25606	2.30303
1	3.00000	3.40000	.17200	3.20000
Total	3.00000	3.83333	.22979	2.58333

DRS	P_SELCRI
0	4.51515
1	4.93333
Total	4.64583

Group standard deviations

DRS	R_ADR	R_ADV_CL	R_ADV_CO	R_EQUAB
0	1.82470	.79177	1.27772	1.73205
1	2.05866	1.80739	2.02837	1.72654
Total	1.92950	1.25460	1.77252	1.71301

DRS	R_FUT_CL	R_FUT_CO	R_INC_CL	R_INC_CO
0	1.71557	1.62252	1.27327	1.11803
1	1.66762	1.26491	1.80476	1.79151
Total	1.70054	1.62742	1.61058	1.43413

DRS	R_MAN_CL	R_MAN_CO	R_NEG_CL	P_DESCH
0	1.56851	1.53062	1.22320	.06323
1	1.29099	1.24595	1.41421	.07283
Total	1.64812	1.45317	1.30194	.07169

DRS	P_DESCOM	P_INV_CL	P_NOMIN	P_REL
0	1.27475	1.23705	.21823	1.26206
1	1.19523	1.45406	.28456	1.20712
Total	1.23771	1.32622	.24103	1.30194

DRS	P_SELCRI
0	1.50252
1	.79881
Total	1.32873

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 46 degrees of freedom

Variable	Wilks' Lambda	F	Significance
R_ADR	.94799	2.5236	.1190
R_ADV_CL	.88936	5.7227	.0209
R_ADV_CO	.74385	15.8401	.0002
R_EQUAB	.99867	.0612	.8057
R_FUT_CL	.97939	.9681	.3303
R_FUT_CO	.85671	7.6938	.0080
R_INC_CL	.79955	11.5322	.0014
R_INC_CO	.87862	6.3548	.0152
R_MAN_CL	.79943	11.5410	.0014
R_MAN_CO	.97434	1.2116	.2768
R_NEG_CL	.95245	2.2963	.1365
P_DESCH	.83709	8.9520	.0044
P_DESCOM	1.00000	.0000	1.0000
P_INV_CL	.95044	2.3986	.1283
P_NOMIN	.97331	1.2613	.2672
P_REL	.89585	5.3477	.0253
P_SELCRI	.97827	1.0219	.3173

-------- D I S C R I M I N A N T   A N A L Y S I S --------

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

Analysis number 1

Stepwise variable selection
Selection rule: maximize minimum Mahalanobis distance (D squared) between groups

Maximum number of steps.................. 34
Minimum tolerance level.................. .00100
Minimum F to enter....................... 1.00000
Maximum F to remove...................... .90000

Canonical Discriminant Functions

Maximum number of functions.............. 1
Minimum cumulative percent of variance... 100.00
Maximum significance of Wilks' Lambda.... 1.0000

Prior probabilities

Group	Prior	Label
0	.68750	
1	.31250	
Total	1.00000	

---------------- Variables in the Analysis after Step 7 ----------------

Variable	Tolerance	F to Remove	D Squared	Between Groups	
R_ADV_CL	.9393581	1.8639	5.3836698	0	1
R_ADV_CO	.9346085	4.0930	4.8859894	0	1
R_FUT_CO	.9301834	7.2905	4.2540283	0	1
R_MAN_CL	.7763702	6.2771	4.4448777	0	1
P_DESCH	.9619873	3.2328	5.0719562	0	1
P_DESCOM	.6789821	5.1915	4.6587983	0	1
P_REL	.7539233	2.8476	5.1576587	0	1

---------------- Variables not in the Analysis after Step 7 ----------------

Variable	Tolerance	Minimum Tolerance	F to Enter	D Squared	Between Groups	
R_ADR	.8343361	.6784571	.1341540	5.8778292	0	1
R_EQUAB	.9647229	.6787868	.0332130	5.8511626	0	1
R_FUT_CL	.3923653	.3923653	.6334617	6.0097360	0	1
R_INC_CL	.6663277	.6663277	.6573792	6.0160545	0	1
R_INC_CO	.6972555	.6762508	.2436240	5.9067489	0	1
R_MAN_CO	.8129861	.6709423	.1619771	5.8851795	0	1
R_NEG_CL	.6360212	.6346369	.7624418	6.0438099	0	1
P_INV_CL	.9280053	.6721786	.0434546	5.8538683	0	1
P_NOMIN	.7817472	.6233925	.0731999	5.8617264	0	1
P_SELCRI	.9224680	.6705228	.0001563	5.8424298	0	1

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered Removed	Vars in	Wilks' Lambda	Sig.	Minimum D Squared	Sig.	Between Groups	
1	R_ADV_CO	1	.74385	.0002	1.53601	.0002	0	1
2	R_FUT_CO	2	.63947	.0000	2.51486	.0000	0	1
3	R_MAN_CL	3	.55512	.0000	3.57485	.0000	0	1
4	P_DESCH	4	.51355	.0000	4.22530	.0000	0	1
5	P_DESCOM	5	.47870	.0000	4.85760	.0000	0	1
6	P_REL	6	.45312	.0000	5.38367	.0000	0	1
7	R_ADV_CL	7	.43294	.0000	5.84239	.0000	0	1

Classification function coefficients
(Fisher's linear discriminant functions)

DRS =	0	1
R_ADV_CL	.6045617	1.1888721
R_ADV_CO	.3148805	.9695145
R_FUT_CO	1.7112531	2.5694839
R_MAN_CL	1.1497174	2.0504441
P_DESCH	18.0210286	31.5194959
P_DESCOM	.5215169	-.5338031
P_REL	1.1384716	1.9035712
(Constant)	-8.6830985	-19.7309647

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr		After Fcn	Wilks' Lambda	Chi-square	df	Sig
					:	0	.432943	35.579	7	.0000
1*	1.3098	100.00	100.00	.7530	:					

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
R_ADV_CL	.28911
R_ADV_CO	.41851
R_FUT_CO	.54062
R_MAN_CL	.55507
P_DESCH	.37024
P_DESCOM	-.54623
P_REL	.39428

Structure matrix:

Pooled within-groups correlations between discriminating variables
and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
R_ADV_CO	.51275
R_MAN_CL	.43767
P_DESCH	.38546
R_FUT_CO	.35735
R_NEG_CL	.34331
R_ADV_CL	.30819
P_REL	.29792
R_INC_CL	.29676
P_INV_CL	-.24223
R_INC_CO	.23713
R_FUT_CL	.23277
R_MAN_CO	-.21897
P_NOMIN	-.19555
R_ADR	.13352
P_SELCRI	.13279
R_EQUAB	-.06994
P_DESCOM	.00000

Unstandardized canonical discriminant function coefficients

	Func 1
R_ADV_CL	.2417399
R_ADV_CO	.2708341
R_FUT_CO	.3550658
R_MAN_CL	.3726471
P_DESCH	5.5845636
P_DESCOM	-.4366053
P_REL	.3165358
(Constant)	-3.7912988

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	-.75534
1	1.66176

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
0	7	-4.044497
1	7	-2.899866
Pooled within-groups covariance matrix	7	-2.276246

Box's M	Approximate F	Degrees of freedom		Significance
65.31473	1.84487	28,	2761.8	.0045

Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0	**	1	.7612	.9462	0	.0538	1.9657
2			0		0	.5334	.9946	1	.0054	-1.3782
3			0		0	.4438	.9962	1	.0038	-1.5212
4			0		0	.9131	.9815	1	.0185	-.8645
5			0		0	.9918	.9767	1	.0233	-.7657
6			0		0	.4044	.8448	1	.1552	.0785
7			0		0	.5693	.9939	1	.0061	-1.3244
8			0		0	.4379	.9963	1	.0037	-1.5311
9			0		0	.5960	.9190	1	.0810	-.2252
10			0		0	.5892	.9172	1	.0828	-.2153
11			0		0	.8227	.9596	1	.0404	-.5312
12			0		0	.2888	.7587	1	.2413	.3055
13			0		0	.6169	.9927	1	.0073	-1.2556
14			0		0	.5117	.9950	1	.0050	-1.4116
15			0		0	.1403	.9993	1	.0007	-2.2300
16			0		0	.7211	.9898	1	.0102	-1.1123
17			0		0	.1302	.9994	1	.0006	-2.2685
18			0		0	.6281	.9268	1	.0732	-.2709
19			0		0	.3511	.8109	1	.1891	.1771
20			0		0	.1355	.9993	1	.0007	-2.2480
21			0		0	.3627	.9973	1	.0027	-1.6656
22			0		0	.0224	.9999	1	.0001	-3.0382
23			0		0	.3098	.7781	1	.2219	.2602
24			0	**	1	.7763	.8094	0	.1906	1.3776
25			0		0	.2548	.9984	1	.0016	-1.8941
26			0		0	.9867	.9770	1	.0230	-.7720
27			0		0	.7561	.9886	1	.0114	-1.0660
28			0		0	.7528	.9502	1	.0498	-.4403
29			0		0	.8315	.9856	1	.0144	-.9681
30			0		0	.4967	.8876	1	.1124	-.0756
31			0		0	.3821	.8316	1	.1684	.1187
32			0		0	.9455	.9797	1	.0203	-.8236
33			0		0	.1490	.5552	1	.4448	.6877
34			1	**	0	.3136	.7814	1	.2186	.2524
35			1		1	.5773	.6869	0	.3131	1.1045
36			1		1	.7402	.9495	0	.0505	1.9934
37			1	**	0	.3936	.8386	1	.1614	.0977
38			1		1	.1441	.9965	0	.0035	3.1226
39			1		1	.5404	.9737	0	.0263	2.2739
40			1		1	.4760	.9793	0	.0207	2.3744
41			1		1	.8255	.8320	0	.1680	1.4413
42			1		1	.5516	.9727	0	.0273	2.2572
43			1		1	.9220	.8694	0	.1306	1.5638
44			1		1	.5987	.9679	0	.0321	2.1880
45			1		1	.8671	.9267	0	.0733	1.8291
46			1		1	.7307	.9510	0	.0490	2.0060
47			1		1	.5412	.6584	0	.3416	1.0508
48			1		1	.7714	.8070	0	.1930	1.3712

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

All-groups Stacked Histogram

Canonical Discriminant Function 1

```
      4 +                      1    2                                 +
        |                      1    2                                 |
        |                      1    2                                 |
 F      |                      1    2                                 |
 r    3 +               1 11   1   121       2  22                    +
 e      |               1 11   1   121       2  22                    |
 q      |               1 11   1   121       2  22                    |
 u      |               1 11   1   121       2  22                    |
 e    2 +               1  11111   111       2  22                    +
 n      |               1  11111   111       2  22                    |
 c      |               1  11111   111       2  22                    |
 y      |               1  11111   111       2  22                    |
      1 +          1    1 1111111111111  22122122      2              +
        |          1    1 1111111111111  22122122      2              |
        |          1    1 1111111111111  22122122      2              |
        |          1    1 1111111111111  22122122      2              |
         X---------+---------+---------+---------+---------+---------X
        out      -4.0      -2.0        .0       2.0       4.0       out
 Class     111111111111111111111111111111111122222222222222222222222222
 Centroids                           1            2
```

Classification results -

Actual Group		No. of Cases	Predicted Group Membership 0	1
Group	0	33	31 93.9%	2 6.1%
Group	1	15	2 13.3%	13 86.7%

Percent of "grouped" cases correctly classified: 91.67%

Classification processing summary

```
48 (Unweighted) cases were processed.
 0 cases were excluded for missing or out-of-range group codes.
 0 cases had at least one missing discriminating variable.
48 (Unweighted) cases were used for printed output.
```

Appendix H
MDA Preliminary Analyses- Three Types of Variable at a Time

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS   DISPUTE RESOLUTION SATISFACTION

48 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
48 (Unweighted) cases will be used in the analysis.

Number of cases by group

DRS	Number of cases Unweighted	Weighted	Label
0	33	33.0	
1	15	15.0	
Total	48	48.0	

Group means

DRS	E_INFL	E_INTRAT	E_TENIN	O_BUDGET
0	.84906	8.29494	6.22148	1.10140
1	.82983	8.42073	2.75013	1.11280
Total	.84305	8.33425	5.13669	1.10496

DRS	O_C_CLAM	O_CAP_CO	O_CLEXP	O_COEXP
0	.71864	.85000	7.15152	3.84848
1	3.19447	.86333	7.06667	2.60000
Total	1.49233	.85417	7.12500	3.45833

DRS	O_PRWKRE	P_DESCH	P_DESCOM	P_INV_CL
0	3.24242	.09403	3.00000	4.03030
1	.93333	.15580	3.00000	3.40000
Total	2.52083	.11333	3.00000	3.83333

DRS	P_NOMIN	P_REL	P_SELCRI
0	.25606	2.30303	4.51515
1	.17200	3.20000	4.93333
Total	.22979	2.58333	4.64583

Group standard deviations

DRS	E_INFL	E_INTRAT	E_TENIN	O_BUDGET
0	.11503	.72658	3.62562	.15225
1	.10637	1.60452	3.52491	.14299
Total	.11163	1.06291	3.91088	.14799

DRS	O_C_CLAM	O_CAP_CO	O_CLEXP	O_COEXP
0	.73667	.26041	7.04504	2.98037
1	8.61436	.23939	6.83966	2.50143
Total	4.88044	.25156	6.90860	2.87290

DRS	O_PRWKRE	P_DESCH	P_DESCOM	P_INV_CL
0	4.30138	.06323	1.27475	1.23705
1	1.38701	.07283	1.19523	1.45406
Total	3.78682	.07169	1.23771	1.32622

DRS	P_NOMIN	P_REL	P_SELCRI
0	.21823	1.26206	1.50252
1	.28456	1.20712	.79881
Total	.24103	1.30194	1.32873

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 46 degrees of freedom

Variable	Wilks' Lambda	F	Significance
E_INFL	.99349	.3014	.5857
E_INTRAT	.99693	.1418	.7082
E_TENIN	.82713	9.6139	.0033
O_BUDGET	.99870	.0599	.8077
O_C_CLAM	.94353	2.7529	.1039
O_CAP_CO	.99938	.0284	.8670
O_CLEXP	.99997	.0015	.9690
O_COEXP	.95856	1.9885	.1652
O_PRWKRE	.91842	4.0862	.0491
P_DESCH	.83709	8.9520	.0044
P_DESCOM	1.00000	.0000	1.0000
P_INV_CL	.95044	2.3986	.1283
P_NOMIN	.97331	1.2613	.2672
P_REL	.89585	5.3477	.0253
P_SELCRI	.97827	1.0219	.3173

-------- D I S C R I M I N A N T   A N A L Y S I S --------

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

Analysis number 1

Stepwise variable selection
Selection rule: maximize minimum Mahalanobis distance (D squared) between groups

Maximum number of steps.................. 30
Minimum tolerance level.................. .00100
Minimum F to enter....................... 1.00000
Maximum F to remove...................... .90000

Canonical Discriminant Functions

Maximum number of functions.............. 1
Minimum cumulative percent of variance... 100.00
Maximum significance of Wilks' Lambda.... 1.0000

Prior probabilities

Group	Prior	Label
0	.68750	
1	.31250	
Total	1.00000	

--------------- Variables in the Analysis after Step 8 ---------------

Variable	Tolerance	F to Remove	D Squared	Between Groups	
E_TENIN	.8732384	12.3652	2.0874903	0	1
O_C_CLAM	.9330867	3.0159	3.4783592	0	1
P_DESCH	.9616915	6.0290	2.9697146	0	1
P_DESCOM	.7708199	1.9964	3.6666111	0	1
P_NOMIN	.8538372	2.2214	3.6242990	0	1
P_REL	.7687473	7.7882	2.7018029	0	1

---------------- Variables not in the Analysis after Step 8 ----------------

Variable	Tolerance	Minimum Tolerance	F to Enter	D Squared	Between Groups	
E_INFL	.8240749	.7119344	.0050773	4.0634218	0	1
E_INTRAT	.9086547	.7472192	.0555223	4.0741703	0	1
O_BUDGET	.7915438	.7485178	.0147651	4.0654860	0	1
O_CAP_CO	.8235867	.7436594	.1065905	4.0850516	0	1
O_CLEXP	.8656313	.7404375	.3622267	4.1395209	0	1
O_COEXP	.9042153	.7635487	.0830660	4.0800391	0	1
O_PRWKRE	.8268349	.6601782	.6172616	4.1938621	0	1
P_INV_CL	.9233988	.7571955	.7592595	4.2241181	0	1
P_SELCRI	.9161460	.7601052	.0490098	4.0727826	0	1

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered	Removed	Vars in	Wilks' Lambda	Sig.	Minimum D Squared	Sig.	Between Groups	
1	E_TENIN		1	.82713	.0033	.93225	.0033	0	1
2	P_DESCH		2	.68882	.0002	2.01508	.0002	0	1
3	O_PRWKRE		3	.63094	.0001	2.60922	.0001	0	1
4	O_C_CLAM		4	.59535	.0001	3.03182	.0001	0	1
5	P_REL		5	.56792	.0002	3.39375	.0002	0	1
6	P_DESCOM		6	.53639	.0002	3.85538	.0002	0	1
7	P_NOMIN		7	.51541	.0002	4.19386	.0002	0	1
8		O_PRWKRE	6	.52336	.0001	4.06234	.0001	0	1

Classification function coefficients
(Fisher's linear discriminant functions)

DRS =	0	1
E_TENIN	.6346982	.2164161
O_C_CLAM	-.0113399	.1537537
P_DESCH	17.1133396	33.1908818
P_DESCOM	1.6835650	1.1108546
P_NOMIN	4.5397524	1.5598527
P_REL	.6271091	1.6951439
(Constant)	-6.9782866	-8.8045471

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr		After Fcn	Wilks' Lambda	Chi-square	df	Sig
					:	0	.523364	27.842	6	.0001
1*	.9107	100.00	100.00	.6904	:					

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
E_TENIN	-.74613
O_C_CLAM	.39251
P_DESCH	.52885
P_DESCOM	-.35550
P_NOMIN	-.35537
P_REL	.66005

Structure matrix:

Pooled within-groups correlations between discriminating variables
and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
E_TENIN	-.47905
P_DESCH	.46226
P_REL	.35728
O_C_CLAM	.25635
P_SELCRI	.20472
P_NOMIN	-.17351
O_COEXP	-.15510
O_PRWKRE	-.14870
O_CLEXP	-.13427
E_INFL	-.07001
O_BUDGET	.06258
P_INV_CL	-.04752
O_CAP_CO	-.04183
E_INTRAT	.00674
P_DESCOM	.00000

Unstandardized canonical discriminant function coefficients

	Func 1
E_TENIN	-.2075301
O_C_CLAM	.0819110
P_DESCH	7.9768519
P_DESCOM	-.2841495
P_NOMIN	-1.4784734
P_REL	.5299041
(Constant)	-.1369938

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	-.62985
1	1.38567

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
0	6	-6.121483
1	6	-2.487905
Pooled within-groups covariance matrix	6	-2.177675

Box's M	Approximate F	Degrees of freedom		Significance
130.54504	5.10506	21,	2890.8	.0000

Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0	**	1	.7376	.8719	0	.1281	1.7207
2			0		0	.7671	.9023	1	.0977	-.3337
3			0	**	1	.7244	.6300	0	.3700	1.0332
4			0		0	.2799	.6551	1	.3449	.4507
5			0		0	.3865	.7454	1	.2546	.2361
6			0	**	1	.9321	.8045	0	.1955	1.4709
7			0		0	.9382	.9515	1	.0485	-.7074
8			0		0	.3325	.9916	1	.0084	-1.5989
9			0		0	.9216	.9534	1	.0466	-.7283
10			0		0	.5563	.8367	1	.1633	-.0415
11			0		0	.2930	.9929	1	.0071	-1.6815
12			0		0	.2756	.9934	1	.0066	-1.7202
13			0		0	.7074	.9728	1	.0272	-1.0052
14			0		0	.7686	.9681	1	.0319	-.9241
15			0		0	.1929	.9957	1	.0043	-1.9320
16			0		0	.3507	.9910	1	.0090	-1.5632
17			0		0	.3656	.9905	1	.0095	-1.5345
18			0		0	.6396	.9773	1	.0227	-1.0981
19			0		0	.7644	.9016	1	.0984	-.3302
20			0		0	.8768	.9246	1	.0754	-.4748
21			0		0	.4060	.7585	1	.2415	.2011
22			0		0	.2566	.9940	1	.0060	-1.7643
23			0		0	.2984	.6734	1	.3266	.4100
24			0		0	.2346	.6044	1	.3956	.5588
25			0		0	.3631	.9906	1	.0094	-1.5393
26			0		0	.2456	.9943	1	.0057	-1.7909
27			0		0	.7862	.9666	1	.0334	-.9011
28			0		0	.3766	.9901	1	.0099	-1.5140
29			0		0	.4294	.9880	1	.0120	-1.4201
30			0		0	.3850	.7443	1	.2557	.2389
31			0		0	.3229	.6957	1	.3043	.3588
32			0		0	.6596	.9760	1	.0240	-1.0703
33			0		0	.2456	.9943	1	.0057	-1.7909
34			1		1	.8943	.8191	0	.1809	1.5185
35			1	**	0	.2301	.5989	1	.4011	.5703
36			1		1	.8688	.8286	0	.1714	1.5509
37			1		1	.9839	.7689	0	.2311	1.3655
38			1		1	.0981	.9898	0	.0102	3.0400
39			1		1	.4485	.9410	0	.0590	2.1436
40			1		1	.5774	.9142	0	.0858	1.9429
41			1		1	.8843	.8229	0	.1771	1.5312
42			1		1	.9357	.8030	0	.1970	1.4664
43			1		1	.5574	.9187	0	.0813	1.9724
44			1		1	.9458	.7513	0	.2487	1.3177
45			1	**	0	.3610	.7268	1	.2732	.2835
46			1	**	0	.2978	.6729	1	.3271	.4112
47			1	**	0	.9241	.9531	1	.0469	-.7251
48			1		1	.3123	.9637	0	.0363	2.3961

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

All-groups Stacked Histogram

Canonical Discriminant Function 1

```
      8 +                                                        +
        |                                                        |
F       |                                                        |
r     6 +               1                                        +
e       |               1                                        |
q       |               1  1                                     |
u       |               1  1                                     |
e     4 +              11  1     22    2                         +
n       |              11  1     22    2                         |
c       |              11  12 1  11    22                        |
y       |              11  12 1  11    22                        |
      2 +              11  11 1  112   22 2                      +
        |              11  11 1  112   22 2                      |
        |             1111 11 1 1111 1 121222  2                 |
        |             1111 11 1 1111 1 121222  2                 |
        X---------+---------+---------+---------+---------+------X
       out      -4.0      -2.0        .0       2.0       4.0    out
 Class    111111111111111111111111111111111111122222222222222222222222222222
Centroids                            1         2
```

Classification results -

Actual Group		No. of Cases	Predicted Group Membership 0	1
Group	0	33	30 90.9%	3 9.1%
Group	1	15	4 26.7%	11 73.3%

Percent of "grouped" cases correctly classified: 85.42%

Classification processing summary

48 (Unweighted) cases were processed.
0 cases were excluded for missing or out-of-range group codes.
0 cases had at least one missing discriminating variable.
48 (Unweighted) cases were used for printed output.

-------- D I S C R I M I N A N T   A N A L Y S I S --------

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

48 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
48 (Unweighted) cases will be used in the analysis.

Number of cases by group

DRS	Number of cases Unweighted	Weighted	Label
0	33	33.0	
1	15	15.0	
Total	48	48.0	

Group means

DRS	E_INFL	E_INTRAT	E_TENIN	O_BUDGET
0	.84906	8.29494	6.22148	1.10140
1	.82983	8.42073	2.75013	1.11280
Total	.84305	8.33425	5.13669	1.10496

DRS	O_C_CLAM	O_CAP_CO	O_CLEXP	O_COEXP
0	.71864	.85000	7.15152	3.84848
1	3.19447	.86333	7.06667	2.60000
Total	1.49233	.85417	7.12500	3.45833

DRS	O_PRWKRE	R_ADR	R_ADV_CL	R_ADV_CO
0	3.24242	2.72727	1.24242	1.48485
1	.93333	3.66667	2.13333	3.40000
Total	2.52083	3.02083	1.52083	2.08333

DRS	R_EQUAB	R_FUT_CL	R_FUT_CO	R_INC_CL
0	3.00000	3.54545	3.48485	2.06061
1	2.86667	4.06667	4.80000	3.60000
Total	2.95833	3.70833	3.89583	2.54167

DRS	R_INC_CO	R_MAN_CL	R_MAN_CO	R_NEG_CL
0	2.00000	3.09091	3.03030	2.39394
1	3.06667	4.66667	2.53333	3.00000
Total	2.33333	3.58333	2.87500	2.58333

Group standard deviations

DRS	E_INFL	E_INTRAT	E_TENIN	O_BUDGET
0	.11503	.72658	3.62562	.15225
1	.10637	1.60452	3.52491	.14299
Total	.11163	1.06291	3.91088	.14799

DRS	O_C_CLAM	O_CAP_CO	O_CLEXP	O_COEXP
0	.73667	.26041	7.04504	2.98037
1	8.61436	.23939	6.83966	2.50143
Total	4.88044	.25156	6.90860	2.87290

DRS	O_PRWKRE	R_ADR	R_ADV_CL	R_ADV_CO
0	4.30138	1.82470	.79177	1.27772
1	1.38701	2.05866	1.80739	2.02837
Total	3.78682	1.92950	1.25460	1.77252

DRS	R_EQUAB	R_FUT_CL	R_FUT_CO	R_INC_CL
0	1.73205	1.71557	1.62252	1.27327
1	1.72654	1.66762	1.26491	1.80476
Total	1.71301	1.70054	1.62742	1.61058

DRS	R_INC_CO	R_MAN_CL	R_MAN_CO	R_NEG_CL
0	1.11803	1.56851	1.53062	1.22320
1	1.79151	1.29099	1.24595	1.41421
Total	1.43413	1.64812	1.45317	1.30194

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 46 degrees of freedom

Variable	Wilks' Lambda	F	Significance
E_INFL	.99349	.3014	.5857
E_INTRAT	.99693	.1418	.7082
E_TENIN	.82713	9.6139	.0033
O_BUDGET	.99870	.0599	.8077
O_C_CLAM	.94353	2.7529	.1039
O_CAP_CO	.99938	.0284	.8670
O_CLEXP	.99997	.0015	.9690
O_COEXP	.95856	1.9885	.1652
O_PRWKRE	.91842	4.0862	.0491
R_ADR	.94799	2.5236	.1190
R_ADV_CL	.88936	5.7227	.0209
R_ADV_CO	.74385	15.8401	.0002
R_EQUAB	.99867	.0612	.8057
R_FUT_CL	.97939	.9681	.3303
R_FUT_CO	.85671	7.6938	.0080
R_INC_CL	.79955	11.5322	.0014
R_INC_CO	.87862	6.3548	.0152
R_MAN_CL	.79943	11.5410	.0014
R_MAN_CO	.97434	1.2116	.2768
R_NEG_CL	.95245	2.2963	.1365

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS   DISPUTE RESOLUTION SATISFACTION

Analysis number 1

Stepwise variable selection
  Selection rule: maximize minimum Mahalanobis distance (D squared) between groups

  Maximum number of steps.................. 40
  Minimum tolerance level.................. .00100
  Minimum F to enter....................... 1.00000
  Maximum F to remove...................... .90000

Canonical Discriminant Functions

  Maximum number of functions.............. 1
  Minimum cumulative percent of variance... 100.00
  Maximum significance of Wilks' Lambda.... 1.0000

Prior probabilities

Group	Prior	Label
0	.68750	
1	.31250	
Total	1.00000	

---------------- Variables in the Analysis after Step 13 ----------------

Variable	Tolerance	F to Remove	D Squared	Between Groups	
E_INFL	.6859561	1.3008	8.7406053	0	1
E_INTRAT	.8156434	3.8775	7.9283331	0	1
E_TENIN	.9011485	6.9592	7.0791487	0	1
O_C_CLAM	.8635808	5.4807	7.4715351	0	1
O_CLEXP	.7073447	6.5414	7.1874010	0	1
O_COEXP	.8360814	4.1175	7.8577499	0	1
R_ADV_CL	.7843106	6.7097	7.1435353	0	1
R_INC_CL	.5007378	25.1578	3.7540226	0	1
R_MAN_CL	.8036597	7.3345	6.9836188	0	1

---------------- Variables not in the Analysis after Step 13 ----------------

Variable	Tolerance	Minimum Tolerance	F to Enter	D Squared	Between Groups	
O_BUDGET	.7330415	.4879943	.1937255	9.2639853	0	1
O_CAP_CO	.7408233	.4801109	.1029278	9.2304807	0	1
O_PRWKRE	.7827202	.4908953	.0253646	9.2018597	0	1
R_ADR	.7578767	.4990471	.2080026	9.2692536	0	1
R_ADV_CO	.7511967	.4178133	.0013735	9.1930069	0	1
R_EQUAB	.9353958	.4994539	.0000292	9.1925108	0	1
R_FUT_CL	.8323499	.4555159	.0736772	9.2196872	0	1
R_FUT_CO	.7915238	.4538040	.3198618	9.3105300	0	1
R_INC_CO	.6152707	.4214373	.0077654	9.1953655	0	1
R_MAN_CO	.8411486	.4940795	.0009053	9.1928341	0	1
R_NEG_CL	.8319363	.4980084	.5970223	9.4128030	0	1

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered	Action Removed	Vars in	Wilks' Lambda	Sig.	Minimum D Squared	Sig.	Between Groups	
1	R_ADV_CO		1	.74385	.0002	1.53601	.0002	0	1
2	R_FUT_CO		2	.63947	.0000	2.51486	.0000	0	1
3	R_MAN_CL		3	.55512	.0000	3.57485	.0000	0	1
4	E_TENIN		4	.51582	.0000	4.18696	.0000	0	1
5	E_INTRAT		5	.49231	.0000	4.60000	.0000	0	1
6	R_INC_CL		6	.46208	.0000	5.19274	.0000	0	1
7	O_COEXP		7	.43607	.0000	5.76839	.0000	0	1
8	O_CLEXP		8	.40336	.0000	6.59801	.0000	0	1
9	R_ADV_CL		9	.37259	.0000	7.51136	.0000	0	1
10		R_ADV_CO	8	.38009	.0000	7.27496	.0000	0	1
11		R_FUT_CO	7	.38702	.0000	7.06499	.0000	0	1
12	O_C_CLAM		8	.33789	.0000	8.74061	.0000	0	1
13	E_INFL		9	.32671	.0000	9.19250	.0000	0	1

Classification function coefficients
(Fisher's linear discriminant functions)

DRS =	0	1
E_INFL	123.6205103	130.8372798
E_INTRAT	11.5288421	12.6893693
E_TENIN	-.2342713	-.6602191
O_C_CLAM	.2455113	.5401072
O_CLEXP	.6092736	.8503750
O_COEXP	-.8884594	-1.3328606
R_ADV_CL	4.5617233	5.9132019
R_INC_CL	9.5881279	11.8520285
R_MAN_CL	1.7375694	2.8505816
(Constant)	-115.8971415	-144.3958114

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	:	After Fcn	Wilks' Lambda	Chi-square	df	Sig
					:	0	.326710	46.425	9	.0000
1*	2.0608	100.00	100.00	.8205	:					

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
E_INFL	.26770
E_INTRAT	.41062
E_TENIN	-.50509
O_C_CLAM	.46561
O_CLEXP	.55531
O_COEXP	-.41673
R_ADV_CL	.53310
R_INC_CL	1.08697
R_MAN_CL	.54681

Structure matrix:

Pooled within-groups correlations between discriminating variables
and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
R_ADV_CO	.41521
R_MAN_CL	.34892
R_INC_CL	.34878
E_TENIN	-.31846
R_ADV_CL	.24570
R_INC_CO	.24506
R_FUT_CO	.18408
O_PRWKRE	-.17939
O_C_CLAM	.17041
R_FUT_CL	.15067
O_COEXP	-.14483
R_MAN_CO	-.11858
R_ADR	.08361
O_CAP_CO	.07263
E_INFL	-.05639
O_BUDGET	-.05036
E_INTRAT	.03868
R_EQUAB	-.02437
R_NEG_CL	.01444
O_CLEXP	-.00401

Unstandardized canonical discriminant function coefficients

	Func 1
E_INFL	2.3802689
E_INTRAT	.3827705
E_TENIN	-.1404881
O_C_CLAM	.0971650
O_CLEXP	.0795212
O_COEXP	-.1465745
R_ADV_CL	.4457510
R_INC_CL	.7466903
R_MAN_CL	.3670989
(Constant)	-8.5710288

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	-.94747
1	2.08444

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
0	9	2.283813
1	9	7.697466
Pooled within-groups covariance matrix	9	8.210577

Box's M	Approximate F	Degrees of freedom		Significance
196.84001	3.18989	45,	2625.2	.0000

Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0		0	.2649	.8813	1	.1187	.1675
2			0		0	.0813	.5249	1	.4751	.7957
3			0		0	.2008	.8184	1	.1816	.3319
4			0		0	.6077	.9787	1	.0213	-.4341
5			0		0	.8417	.9917	1	.0083	-.7477
6			0		0	.6460	.9989	1	.0011	-1.4068
7			0		0	.2517	.9999	1	.0001	-2.0937
8			0		0	.6935	.9851	1	.0149	-.5534
9			0		0	.5793	.9760	1	.0240	-.3931
10			0		0	.3519	.9997	1	.0003	-1.8784
11			0		0	.1633	.9999	1	.0001	-2.3416
12			0		0	.4249	.9996	1	.0004	-1.7454
13			0		0	.6220	.9990	1	.0010	-1.4405
14			0		0	.8481	.9974	1	.0026	-1.1390
15			0		0	.7143	.9985	1	.0015	-1.3136
16			0		0	.7883	.9980	1	.0020	-1.2160
17			0		0	.0838	1.0000	1	.0000	-2.6767
18			0		0	.3485	.9271	1	.0729	-.0100
19			0		0	.7938	.9900	1	.0100	-.6861
20			0		0	.3441	.9997	1	.0003	-1.8936
21			0		0	.9288	.9965	1	.0035	-1.0369
22			0		0	.1108	1.0000	1	.0000	-2.5419
23			0		0	.2584	.8763	1	.1237	.1827
24			0		0	.9751	.9958	1	.0042	-.9787
25			0		0	.3859	.9997	1	.0003	-1.8145
26			0	**	1	.4095	.7870	0	.2130	1.2596
27			0		0	.7443	.9983	1	.0017	-1.2736
28			0		0	.1273	.6816	1	.3184	.5774
29			0		0	.7873	.9980	1	.0020	-1.2173
30			0		0	.7272	.9984	1	.0016	-1.2964
31			0		0	.3816	.9997	1	.0003	-1.8224
32			0		0	.4215	.9996	1	.0004	-1.7513
33			0	**	1	.3354	.7083	0	.2917	1.1211
34			1		1	.9679	.9755	0	.0245	2.0443
35			1		1	.2204	.5231	0	.4769	.8591
36			1		1	.3766	.7553	0	.2447	1.2002
37			1		1	.2527	.5841	0	.4159	.9405
38			1		1	.3653	.9986	0	.0014	2.9898
39			1		1	.6906	.9934	0	.0066	2.4825
40			1		1	.4336	.9979	0	.0021	2.8675
41			1		1	.8152	.9569	0	.0431	1.8507
42			1		1	.0860	.9999	0	.0001	3.8013
43			1		1	.2541	.5867	0	.4133	.9440
44			1		1	.6228	.9950	0	.0050	2.5763
45			1		1	.7632	.9912	0	.0088	2.3857
46			1		1	.3900	.7688	0	.2312	1.2247
47			1		1	.5187	.9840	0	.0160	2.1866
48			1		1	.4071	.9982	0	.0018	2.9134

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

```
                    All-groups Stacked Histogram

                  Canonical Discriminant Function 1
      8 +                                                            +
        |                                                            |
 F      |                                                            |
 r    6 +                     1                                      +
 e      |                     1                                      |
 q      |                     1  1                                   |
 u      |                     1  1                                   |
 e    4 +                     1  1          2                        +
 n      |                     1  1          2                        |
 c      |                     1 11          2                        |
 y      |                     1 11          2                        |
      2 +                1    1 111 11  1  221     2  2              +
        |                1    1 111 11  1  221     2  2              |
        |               11 11 111111 1111121  2222222    2           |
        |               11 11 111111 1111121  2222222    2           |
        X---------+---------+---------+---------+---------+----------X
       out      -4.0      -2.0       .0       2.0       4.0        out
 Class    111111111111111111111111111111111111112222222222222222222222222
 Centroids                           1              2
```

Classification results -

Actual Group		No. of Cases	Predicted Group Membership 0	1
Group	0	33	31 93.9%	2 6.1%
Group	1	15	0 .0%	15 100.0%

Percent of "grouped" cases correctly classified: 95.83%

Classification processing summary

48 (Unweighted) cases were processed.
0 cases were excluded for missing or out-of-range group codes.
0 cases had at least one missing discriminating variable.
48 (Unweighted) cases were used for printed output.

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

48 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
48 (Unweighted) cases will be used in the analysis.

Number of cases by group

DRS	Number of cases Unweighted	Weighted	Label
0	33	33.0	
1	15	15.0	
Total	48	48.0	

Group means

DRS	E_INFL	E_INTRAT	E_TENIN	R_ADR
0	.84906	8.29494	6.22148	2.72727
1	.82983	8.42073	2.75013	3.66667
Total	.84305	8.33425	5.13669	3.02083

DRS	R_ADV_CL	R_ADV_CO	R_EQUAB	R_FUT_CL
0	1.24242	1.48485	3.00000	3.54545
1	2.13333	3.40000	2.86667	4.06667
Total	1.52083	2.08333	2.95833	3.70833

DRS	R_FUT_CO	R_INC_CL	R_INC_CO	R_MAN_CL
0	3.48485	2.06061	2.00000	3.09091
1	4.80000	3.60000	3.06667	4.66667
Total	3.89583	2.54167	2.33333	3.58333

DRS	R_MAN_CO	R_NEG_CL	P_DESCH	P_DESCOM
0	3.03030	2.39394	.09403	3.00000
1	2.53333	3.00000	.15580	3.00000
Total	2.87500	2.58333	.11333	3.00000

DRS	P_INV_CL	P_NOMIN	P_REL	P_SELCRI
0	4.03030	.25606	2.30303	4.51515
1	3.40000	.17200	3.20000	4.93333
Total	3.83333	.22979	2.58333	4.64583

Group standard deviations

DRS	E_INFL	E_INTRAT	E_TENIN	R_ADR
0	.11503	.72658	3.62562	1.82470
1	.10637	1.60452	3.52491	2.05866
Total	.11163	1.06291	3.91088	1.92950

DRS	R_ADV_CL	R_ADV_CO	R_EQUAB	R_FUT_CL
0	.79177	1.27772	1.73205	1.71557
1	1.80739	2.02837	1.72654	1.66762
Total	1.25460	1.77252	1.71301	1.70054

DRS	R_FUT_CO	R_INC_CL	R_INC_CO	R_MAN_CL
0	1.62252	1.27327	1.11803	1.56851
1	1.26491	1.80476	1.79151	1.29099
Total	1.62742	1.61058	1.43413	1.64812

DRS	R_MAN_CO	R_NEG_CL	P_DESCH	P_DESCOM
0	1.53062	1.22320	.06323	1.27475
1	1.24595	1.41421	.07283	1.19523
Total	1.45317	1.30194	.07169	1.23771

DRS	P_INV_CL	P_NOMIN	P_REL	P_SELCRI
0	1.23705	.21823	1.26206	1.50252
1	1.45406	.28456	1.20712	.79881
Total	1.32622	.24103	1.30194	1.32873

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 46 degrees of freedom

Variable	Wilks' Lambda	F	Significance
E_INFL	.99349	.3014	.5857
E_INTRAT	.99693	.1418	.7082
E_TENIN	.82713	9.6139	.0033
R_ADR	.94799	2.5236	.1190
R_ADV_CL	.88936	5.7227	.0209
R_ADV_CO	.74385	15.8401	.0002
R_EQUAB	.99867	.0612	.8057
R_FUT_CL	.97939	.9681	.3303
R_FUT_CO	.85671	7.6938	.0080
R_INC_CL	.79955	11.5322	.0014
R_INC_CO	.87862	6.3548	.0152
R_MAN_CL	.79943	11.5410	.0014
R_MAN_CO	.97434	1.2116	.2768
R_NEG_CL	.95245	2.2963	.1365
P_DESCH	.83709	8.9520	.0044
P_DESCOM	1.00000	.0000	1.0000
P_INV_CL	.95044	2.3986	.1283
P_NOMIN	.97331	1.2613	.2672
P_REL	.89585	5.3477	.0253
P_SELCRI	.97827	1.0219	.3173

- - - - - - - - D I S C R I M I N A N T A N A L Y S I S - - - - - - - -

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

Analysis number 1

Stepwise variable selection
Selection rule: maximize minimum Mahalanobis distance (D squared) between groups

Maximum number of steps.................. 40
Minimum tolerance level.................. .00100
Minimum F to enter...................... 1.00000
Maximum F to remove...................... .90000

Canonical Discriminant Functions

Maximum number of functions.............. 1
Minimum cumulative percent of variance... 100.00
Maximum significance of Wilks' Lambda.... 1.0000

Prior probabilities

Group	Prior	Label
0	.68750	
1	.31250	
Total	1.00000	

---------------- Variables in the Analysis after Step 11 ----------------

Variable	Tolerance	F to Remove	D Squared	Between Groups	
E_INTRAT	.7418483	3.3346	7.4657649	0	1
E_TENIN	.8487717	9.9548	5.8193314	0	1
R_ADV_CL	.8834593	2.4255	7.7339905	0	1
R_FUT_CO	.7828136	1.3115	8.0795430	0	1
R_INC_CL	.6998885	4.5022	7.1381240	0	1
R_MAN_CL	.6841762	10.5724	5.6886073	0	1
P_DESCH	.9392539	3.3412	7.4638695	0	1
P_DESCOM	.5963185	8.4810	6.1452878	0	1
P_REL	.7542094	2.1850	7.8069690	0	1

---------------- Variables not in the Analysis after Step 11 ----------------

Variable	Tolerance	Minimum Tolerance	F to Enter	D Squared	Between Groups	
E_INFL	.5048994	.4909455	.1594943	8.5682665	0	1
R_ADR	.8011093	.5909896	.4274412	8.6622141	0	1
R_ADV_CO	.7412494	.5960095	.5898898	8.7191719	0	1
R_EQUAB	.9372672	.5963184	.0331475	8.5239668	0	1
R_FUT_CL	.3736112	.3648748	.1836500	8.5767360	0	1
R_INC_CO	.5485079	.5485079	.7255575	8.7667398	0	1
R_MAN_CO	.8283515	.5925132	.0024326	8.5131975	0	1
R_NEG_CL	.7256688	.5925445	.0260655	8.5214836	0	1
P_INV_CL	.8522158	.5865533	.7102396	8.7613690	0	1
P_NOMIN	.6696090	.5511077	.2628804	8.6045158	0	1
P_SELCRI	.8133056	.5838351	.0034550	8.5135560	0	1

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered	Action Removed	Vars in	Wilks' Lambda	Sig.	Minimum D Squared	Sig.	Between Groups	
1	R_ADV_CO		1	.74385	.0002	1.53601	.0002	0	1
2	R_FUT_CO		2	.63947	.0000	2.51486	.0000	0	1
3	R_MAN_CL		3	.55512	.0000	3.57485	.0000	0	1
4	P_DESCH		4	.51355	.0000	4.22530	.0000	0	1
5	E_TENIN		5	.46988	.0000	5.03254	.0000	0	1
6	P_DESCOM		6	.42374	.0000	6.06619	.0000	0	1
7	E_INTRAT		7	.38645	.0000	7.08205	.0000	0	1
8	R_INC_CL		8	.36738	.0000	7.68115	.0000	0	1
9	R_ADV_CL		9	.35347	.0000	8.15905	.0000	0	1
10	P_REL		10	.33844	.0000	8.71917	.0000	0	1
11		R_ADV_CO	9	.34384	.0000	8.51234	.0000	0	1

Classification function coefficients
(Fisher's linear discriminant functions)

DRS =	0	1
E_INTRAT	9.1736669	10.2808817
E_TENIN	-.1776592	-.6731008
R_ADV_CL	.5573821	1.3422224
R_FUT_CO	1.3175084	1.8058561
R_INC_CL	2.5345302	3.4971121
R_MAN_CL	3.1633591	4.5272448
P_DESCH	10.2703477	26.2067194
P_DESCOM	-1.3974002	-2.9898944
P_REL	-.0375371	.7388642
(Constant)	-46.3551570	-64.8868501

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr		After Fcn	Wilks' Lambda	Chi-square	df	Sig
					:	0	.343839	44.305	9	.0000
1*	1.9083	100.00	100.00	.8100	:					

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
E_INTRAT	.40710
E_TENIN	-.61052
R_ADV_CL	.32171
R_FUT_CO	.25485
R_INC_CL	.48027
R_MAN_CL	.69631
P_DESCH	.36213
P_DESCOM	-.68287
P_REL	.33147

Structure matrix:

Pooled within-groups correlations between discriminating variables
and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
R_INC_CO	.39709
R_MAN_CL	.36259
R_INC_CL	.36245
E_TENIN	-.33093
P_INV_CL	-.32320
P_DESCH	.31934
R_FUT_CO	.29605
R_ADV_CO	.29059
R_ADV_CL	.25533
P_REL	.24682
R_NEG_CL	.18965
R_FUT_CL	.15818
R_MAN_CO	-.12659
P_SELCRI	.11865
E_INFL	-.11619
R_EQUAB	-.06218
R_ADR	.05079
E_INTRAT	.04019
P_NOMIN	-.03472
P_DESCOM	.00000

Unstandardized canonical discriminant function coefficients

	Func 1
E_INTRAT	.3794961
E_TENIN	-.1698118
R_ADV_CL	.2690027
R_FUT_CO	.1673804
R_INC_CL	.3299234
R_MAN_CL	.4674696
P_DESCH	5.4621655
P_DESCOM	-.5458248
P_REL	.2661103
(Constant)	-5.5344166

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	-.91175
1	2.00584

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
0	9	-2.510348
1	9	-1.257899
Pooled within-groups covariance matrix	9	-.257396

Box's M	Approximate F	Degrees of freedom		Significance
86.10149	1.39532	45,	2625.2	.0426

Case Number	Mis Val	Sel	Actual Group	Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0 **	1	.5305	.8372	0	.1628	1.3785
2			0	0	.6021	.9713	1	.0287	-.3903
3			0	0	.2210	.8136	1	.1864	.3122
4			0	0	.7241	.9823	1	.0177	-.5588
5			0	0	.7213	.9821	1	.0179	-.5550
6			0	0	.2185	.8107	1	.1893	.3187
7			0	0	.2586	.9998	1	.0002	-2.0415
8			0	0	.4359	.9993	1	.0007	-1.6909
9			0	0	.5346	.9621	1	.0379	-.2908
10			0	0	.7734	.9972	1	.0028	-1.1996
11			0	0	.4009	.9994	1	.0006	-1.7518
12			0	0	.7253	.9824	1	.0176	-.5604
13			0	0	.7296	.9977	1	.0023	-1.2574
14			0	0	.6335	.9984	1	.0016	-1.3885
15			0	0	.0698	1.0000	1	.0000	-2.7252
16			0	0	.6626	.9982	1	.0018	-1.3480
17			0	0	.0547	1.0000	1	.0000	-2.8326
18			0	0	.6173	.9731	1	.0269	-.4120
19			0	0	.1940	.7781	1	.2219	.3872
20			0	0	.2790	.9997	1	.0003	-1.9943
21			0	0	.7963	.9970	1	.0030	-1.1699
22			0	0	.0152	1.0000	1	.0000	-3.3383
23			0	0	.1671	.7338	1	.2662	.4698
24			0	0	.5321	.9616	1	.0384	-.2869
25			0	0	.2355	.9998	1	.0002	-2.0982
26			0	0	.8117	.9968	1	.0032	-1.1500
27			0	0	.5228	.9990	1	.0010	-1.5508
28			0	0	.3139	.8915	1	.1085	.0954
29			0	0	.6810	.9981	1	.0019	-1.3229
30			0	0	.9718	.9942	1	.0058	-.9471
31			0	0	.2775	.8672	1	.1328	.1742
32			0	0	.6650	.9777	1	.0223	-.4788
33			0	0	.3039	.8854	1	.1146	.1165
34			1	1	.9926	.9705	0	.0295	2.0152
35			1	1	.4623	.7897	0	.2103	1.2708
36			1	1	.6467	.8938	0	.1062	1.5475
37			1	1	.2589	.5434	0	.4566	.8769
38			1	1	.2929	.9986	0	.0014	3.0577
39			1	1	.6322	.9923	0	.0077	2.4845
40			1	1	.1119	.9997	0	.0003	3.5954
41			1	1	.7751	.9866	0	.0134	2.2915
42			1	1	.3080	.9984	0	.0016	3.0252
43			1	1	.8402	.9468	0	.0532	1.8043
44			1	1	.9661	.9732	0	.0268	2.0483
45			1	1	.4552	.7839	0	.2161	1.2590
46			1	1	.9046	.9785	0	.0215	2.1257
47			1	1	.9171	.9775	0	.0225	2.1099
48			1 **	0	.1368	.6691	1	.3309	.5759

Symbols used in plots

```
Symbol  Group  Label
------  -----  --------------------

  1        0
  2        1
```

All-groups Stacked Histogram

Canonical Discriminant Function 1

```
       4 +                       1       1                           +
         |                       1       1                           |
         |                       1       1                           |
F        |                       1       1                           |
r      3 +                   1  11  11   1        2                  +
e        |                   1  11  11   1        2                  |
q        |                   1  11  11   1        2                  |
u        |                   1  11  11   1        2                  |
e      2 +               1   1 111  111 11   2   22   2              +
n        |               1   1 111  111 11   2   22   2              |
c        |               1   1 111  111 11   2   22   2              |
y        |               1   1 111  111 11   2   22   2              |
       1 +            1  1   111111 11111122 2122222  2  2           +
         |            1  1   111111 11111122 2122222  2  2           |
         |            1  1   111111 11111122 2122222  2  2           |
         |            1  1   111111 11111122 2122222  2  2           |
         X---------+---------+---------+---------+---------+---------X
        out     -4.0      -2.0        .0       2.0       4.0         out
   Class 1111111111111111111111111111111111122222222222222222222222222
Centroids                          1              2
```

Classification results -

Actual Group		No. of Cases	Predicted Group Membership 0	1
Group	0	33	32 97.0%	1 3.0%
Group	1	15	1 6.7%	14 93.3%

Percent of "grouped" cases correctly classified: 95.83%

Classification processing summary

48 (Unweighted) cases were processed.
0 cases were excluded for missing or out-of-range group codes.
0 cases had at least one missing discriminating variable.
48 (Unweighted) cases were used for printed output.

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS   DISPUTE RESOLUTION SATISFACTION

48 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
48 (Unweighted) cases will be used in the analysis.

Number of cases by group

DRS	Number of cases Unweighted	Weighted	Label
0	33	33.0	
1	15	15.0	
Total	48	48.0	

Group means

DRS	R_ADR	R_ADV_CL	R_ADV_CO	R_EQUAB
0	2.72727	1.24242	1.48485	3.00000
1	3.66667	2.13333	3.40000	2.86667
Total	3.02083	1.52083	2.08333	2.95833

DRS	R_FUT_CL	R_FUT_CO	R_INC_CL	R_INC_CO
0	3.54545	3.48485	2.06061	2.00000
1	4.06667	4.80000	3.60000	3.06667
Total	3.70833	3.89583	2.54167	2.33333

DRS	R_MAN_CL	R_MAN_CO	R_NEG_CL	P_DESCH
0	3.09091	3.03030	2.39394	.09403
1	4.66667	2.53333	3.00000	.15580
Total	3.58333	2.87500	2.58333	.11333

DRS	P_DESCOM	P_INV_CL	P_NOMIN	P_REL
0	3.00000	4.03030	.25606	2.30303
1	3.00000	3.40000	.17200	3.20000
Total	3.00000	3.83333	.22979	2.58333

DRS	P_SELCRI	O_BUDGET	O_C_CLAM	O_CAP_CO
0	4.51515	1.10140	.71864	.85000
1	4.93333	1.11280	3.19447	.86333
Total	4.64583	1.10496	1.49233	.85417

DRS	O_CLEXP	O_COEXP	O_PRWKRE
0	7.15152	3.84848	3.24242
1	7.06667	2.60000	.93333
Total	7.12500	3.45833	2.52083

Group standard deviations

DRS	R_ADR	R_ADV_CL	R_ADV_CO	R_EQUAB
0	1.82470	.79177	1.27772	1.73205
1	2.05866	1.80739	2.02837	1.72654
Total	1.92950	1.25460	1.77252	1.71301

DRS	R_FUT_CL	R_FUT_CO	R_INC_CL	R_INC_CO
0	1.71557	1.62252	1.27327	1.11803
1	1.66762	1.26491	1.80476	1.79151
Total	1.70054	1.62742	1.61058	1.43413

DRS	R_MAN_CL	R_MAN_CO	R_NEG_CL	P_DESCH
0	1.56851	1.53062	1.22320	.06323
1	1.29099	1.24595	1.41421	.07283
Total	1.64812	1.45317	1.30194	.07169

DRS	P_DESCOM	P_INV_CL	P_NOMIN	P_REL
0	1.27475	1.23705	.21823	1.26206
1	1.19523	1.45406	.28456	1.20712
Total	1.23771	1.32622	.24103	1.30194

DRS	P_SELCRI	O_BUDGET	O_C_CLAM	O_CAP_CO
0	1.50252	.15225	.73667	.26041
1	.79881	.14299	8.61436	.23939
Total	1.32873	.14799	4.88044	.25156

DRS	O_CLEXP	O_COEXP	O_PRWKRE
0	7.04504	2.98037	4.30138
1	6.83966	2.50143	1.38701
Total	6.90860	2.87290	3.78682

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 46 degrees of freedom

Variable	Wilks' Lambda	F	Significance
R_ADR	.94799	2.5236	.1190
R_ADV_CL	.88936	5.7227	.0209
R_ADV_CO	.74385	15.8401	.0002
R_EQUAB	.99867	.0612	.8057
R_FUT_CL	.97939	.9681	.3303
R_FUT_CO	.85671	7.6938	.0080
R_INC_CL	.79955	11.5322	.0014
R_INC_CO	.87862	6.3548	.0152
R_MAN_CL	.79943	11.5410	.0014
R_MAN_CO	.97434	1.2116	.2768
R_NEG_CL	.95245	2.2963	.1365
P_DESCH	.83709	8.9520	.0044

Variable	Wilks' Lambda	F	Significance
P_DESCOM	1.00000	.0000	1.0000
P_INV_CL	.95044	2.3986	.1283
P_NOMIN	.97331	1.2613	.2672
P_REL	.89585	5.3477	.0253
P_SELCRI	.97827	1.0219	.3173
O_BUDGET	.99870	.0599	.8077
O_C_CLAM	.94353	2.7529	.1039
O_CAP_CO	.99938	.0284	.8670
O_CLEXP	.99997	.0015	.9690
O_COEXP	.95856	1.9885	.1652
O_PRWKRE	.91842	4.0862	.0491

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS   DISPUTE RESOLUTION SATISFACTION

Analysis number 1

Stepwise variable selection
Selection rule: maximize minimum Mahalanobis distance (D squared) between groups

Maximum number of steps.................. 46
Minimum tolerance level.................. .00100
Minimum F to enter....................... 1.00000
Maximum F to remove...................... .90000

Canonical Discriminant Functions

Maximum number of functions.............. 1
Minimum cumulative percent of variance... 100.00
Maximum significance of Wilks' Lambda.... 1.0000

Prior probabilities

Group	Prior	Label
0	.68750	
1	.31250	
Total	1.00000	

---------------- Variables in the Analysis after Step 14 ----------------

Variable	Tolerance	F to Remove	D Squared	Between Groups	
R_ADV_CL	.7650660	3.1598	9.7377183	0	1
R_FUT_CL	.3624598	2.9570	9.8135861	0	1
R_FUT_CO	.3140051	6.1237	8.7144018	0	1
R_INC_CL	.6135382	7.2448	8.3647618	0	1
R_MAN_CL	.6487757	10.1071	7.5509283	0	1
P_DESCH	.8287648	3.3627	9.6626100	0	1
P_DESCOM	.6403423	3.7389	9.5254663	0	1
P_REL	.6799824	5.2795	8.9905357	0	1
P_SELCRI	.6454108	2.0727	10.1540601	0	1
O_C_CLAM	.8206158	4.1894	9.3647087	0	1
O_CLEXP	.4904175	12.1432	7.0321404	0	1
O_COEXP	.6807606	7.0513	8.4237697	0	1

---------------- Variables not in the Analysis after Step 14 ----------------

Variable	Tolerance	Minimum Tolerance	F to Enter	D Squared	Between Groups	
R_ADR	.4871318	.2486304	.0460152	11.0404982	0	1
R_ADV_CO	.6961565	.3135849	.0120630	11.0250398	0	1
R_EQUAB	.9232129	.3137776	.0322484	11.0342302	0	1
R_INC_CO	.5963939	.2966785	.0001592	11.0196200	0	1
R_MAN_CO	.6648037	.2967384	.1260912	11.0769567	0	1
R_NEG_CL	.5389404	.3101543	.1820879	11.1024519	0	1
P_INV_CL	.7281872	.3129413	.7064200	11.3411796	0	1
P_NOMIN	.6136554	.3052654	.1858212	11.1041517	0	1
O_BUDGET	.6939140	.3139369	.0830254	11.0573489	0	1
O_CAP_CO	.6818232	.2967449	.1993081	11.1102922	0	1
O_PRWKRE	.3789604	.3050428	.1018877	11.0659369	0	1

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered	Action Removed	Vars in	Wilks' Lambda	Sig.	Minimum D Squared	Sig.	Between Groups	
1	R_ADV_CO		1	.74385	.0002	1.53601	.0002	0	1
2	R_FUT_CO		2	.63947	.0000	2.51486	.0000	0	1
3	R_MAN_CL		3	.55512	.0000	3.57485	.0000	0	1
4	P_DESCH		4	.51355	.0000	4.22530	.0000	0	1
5	P_DESCOM		5	.47870	.0000	4.85760	.0000	0	1
6	P_REL		6	.45312	.0000	5.38367	.0000	0	1
7	O_COEXP		7	.42855	.0000	5.94794	.0000	0	1
8	O_CLEXP		8	.40026	.0000	6.68370	.0000	0	1
9	R_FUT_CL		9	.37425	.0000	7.45803	.0000	0	1
10	P_SELCRI		10	.35165	.0000	8.22428	.0000	0	1
11	R_INC_CL		11	.33582	.0000	8.82224	.0000	0	1
12		R_ADV_CO	10	.34334	.0000	8.53132	.0000	0	1
13	O_C_CLAM		11	.31416	.0000	9.73772	.0000	0	1
14	R_ADV_CL		12	.28815	.0000	11.01955	.0000	0	1

Classification function coefficients
(Fisher's linear discriminant functions)

DRS =	0	1
R_ADV_CL	1.6877013	2.7700111
R_FUT_CL	.5711725	-.5010920
R_FUT_CO	.4452886	2.2247752
R_INC_CL	1.3248541	2.7538066
R_MAN_CL	1.0857218	2.6380405
P_DESCH	23.7608797	43.0612736
P_DESCOM	1.3408737	.1199355
P_REL	1.1382121	2.5250172
P_SELCRI	2.3644509	1.4927289
O_C_CLAM	.1876567	.4840034
O_CLEXP	.3431537	.7514821
O_COEXP	.5313749	-.1554341
(Constant)	-18.3484482	-34.0333895

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr		After Fcn	Wilks' Lambda	Chi-square	df	Sig
					:	0	.288150	49.771	12	.0000
1*	2.4704	100.00	100.00	.8437	:					

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
R_ADV_CL	.38993
R_FUT_CL	-.54948
R_FUT_CO	.81620
R_INC_CL	.62663
R_MAN_CL	.69654
P_DESCH	.38546
P_DESCOM	-.46015
P_REL	.52037
P_SELCRI	-.34884
O_C_CLAM	.42779
O_CLEXP	.85897
O_COEXP	-.58824

Structure matrix:

Pooled within-groups correlations between discriminating variables
and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
R_ADV_CO	.35472
R_MAN_CL	.31868
R_INC_CL	.31856
P_DESCH	.28067
R_FUT_CO	.26020
R_INC_CO	.23846
O_PRWKRE	-.22957
R_ADV_CL	.22441
P_REL	.21693
P_NOMIN	-.17399
O_C_CLAM	.15564
O_COEXP	-.13228
R_ADR	.11859
P_SELCRI	.09483
R_FUT_CL	.09230
O_CAP_CO	.09073
R_NEG_CL	.07848
R_EQUAB	-.05829
R_MAN_CO	-.04440
O_BUDGET	-.02582
O_CLEXP	-.00366
P_INV_CL	.00050
P_DESCOM	.00000

Unstandardized canonical discriminant function coefficients

	Func 1
R_ADV_CL	.3260391
R_FUT_CL	-.3230130
R_FUT_CO	.5360593
R_INC_CL	.4304631
R_MAN_CL	.4676264
P_DESCH	5.8141240
P_DESCOM	-.3678001
P_REL	.4177664
P_SELCRI	-.2626009
O_C_CLAM	.0892726
O_CLEXP	.1230064
O_COEXP	-.2068970
(Constant)	-3.8650540

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	-1.03737
1	2.28220

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
0	12	-.677679
1	12	-.880009
Pooled within-groups covariance matrix	12	6.092885

Box's M	Approximate F	Degrees of freedom		Significance
314.27854	2.55480	78,	2535.9	.0000

Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0		0	.0739	.5903	1	.4097	.7499
2			0		0	.5062	.9998	1	.0002	-1.7021
3			0		0	.3637	.9999	1	.0001	-1.9457
4			0		0	.5260	.9998	1	.0002	-1.6715
5			0		0	.9571	.9978	1	.0022	-.9836
6			0		0	.7585	.9993	1	.0007	-1.3449
7			0		0	.1291	1.0000	1	.0000	-2.5551
8			0		0	.8473	.9965	1	.0035	-.8447
9			0		0	.9545	.9978	1	.0022	-.9804
10			0		0	.9417	.9977	1	.0023	-.9642
11			0		0	.5388	.9998	1	.0002	-1.6521
12			0		0	.5703	.9997	1	.0003	-1.6050
13			0		0	.7127	.9938	1	.0062	-.6692
14			0		0	.4629	.9998	1	.0002	-1.7715
15			0		0	.2355	1.0000	1	.0000	-2.2237
16			0		0	.8551	.9990	1	.0010	-1.2200
17			0		0	.0708	1.0000	1	.0000	-2.8444
18			0		0	.1958	.8812	1	.1188	.2562
19			0		0	.6565	.9920	1	.0080	-.5927
20			0		0	.3181	.9999	1	.0001	-2.0357
21			0		0	.4380	.9764	1	.0236	-.2617
22			0		0	.0436	1.0000	1	.0000	-3.0557
23			0		0	.0619	.5251	1	.4749	.8296
24			0		0	.2142	.8980	1	.1020	.2046
25			0		0	.5774	.9997	1	.0003	-1.5945
26			0		0	.2384	.9156	1	.0844	.1417
27			0		0	.1888	.8739	1	.1261	.2768
28			0		0	.4929	.9824	1	.0176	-.3517
29			0		0	.9308	.9986	1	.0014	-1.1242
30			0		0	.2763	.9361	1	.0639	.0513
31			0		0	.4537	.9784	1	.0216	-.2881
32			0		0	.2295	1.0000	1	.0000	-2.2391
33			0		0	.4148	.9732	1	.0268	-.2219
34			1	**	0	.1164	.7477	1	.2523	.5326
35			1		1	.2564	.7219	0	.2781	1.1473
36			1		1	.7164	.9973	0	.0027	2.6455
37			1	**	0	.1162	.7472	1	.2528	.5335
38			1		1	.5468	.9988	0	.0012	2.8847
39			1		1	.6377	.9981	0	.0019	2.7531
40			1		1	.3395	.9996	0	.0004	3.2374
41			1		1	.8608	.9843	0	.0157	2.1069
42			1		1	.3933	.9995	0	.0005	3.1359
43			1		1	.9664	.9923	0	.0077	2.3243
44			1		1	.5748	.9986	0	.0014	2.8431
45			1		1	.3630	.9996	0	.0004	3.1918
46			1		1	.4855	.9173	0	.0827	1.5848
47			1		1	.8724	.9851	0	.0149	2.1216
48			1		1	.3637	.9996	0	.0004	3.1905

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

All-groups Stacked Histogram

Canonical Discriminant Function 1

```
     4 +                       1        1               2      +
       |                       1        1               2      |
       |                       1        1               2      |
  F    |                       1        1               2      |
  r  3 +                       1  1   1 1             2 2      +
  e    |                       1  1   1 1             2 2      |
  q    |                       1  1   1 1             2 2      |
  u    |                       1  1   1 1             2 2      |
  e  2 +                    1111 11 1 1 1 21       2  2 2      +
  n    |                    1111 11 1 1 1 21       2  2 2      |
  c    |                    1111 11 1 1 1 21       2  2 2      |
  y    |                    1111 11 1 1 1 21       2  2 2      |
     1 +                111 1111111111111 21 2 2  2222 2      +
       |                111 1111111111111 21 2 2  2222 2      |
       |                111 1111111111111 21 2 2  2222 2      |
       |                111 1111111111111 21 2 2  2222 2      |
    X----------+---------+---------+---------+---------+--------X
  out        -4.0      -2.0        .0       2.0       4.0     out
Class  111111111111111111111111111111111111122222222222222222222222222
Centroids                       1                2
```

Classification results -

Actual Group		No. of Cases	Predicted Group Membership 0	Predicted Group Membership 1
Group	0	33	33 100.0%	0 .0%
Group	1	15	2 13.3%	13 86.7%

Percent of "grouped" cases correctly classified: 95.83%

Classification processing summary

```
48 (Unweighted) cases were processed.
 0 cases were excluded for missing or out-of-range group codes.
 0 cases had at least one missing discriminating variable.
48 (Unweighted) cases were used for printed output.
```

Appendix I
MDA Preliminary Analyses - Four Types of Variables Together

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

48 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
48 (Unweighted) cases will be used in the analysis.

Number of cases by group

DRS	Number of cases Unweighted	Weighted	Label
0	33	33.0	
1	15	15.0	
Total	48	48.0	

Group means

DRS	R_ADR	R_ADV_CL	R_ADV_CO	R_EQUAB
0	2.72727	1.24242	1.48485	3.00000
1	3.66667	2.13333	3.40000	2.86667
Total	3.02083	1.52083	2.08333	2.95833

DRS	R_FUT_CL	R_FUT_CO	R_INC_CL	R_INC_CO
0	3.54545	3.48485	2.06061	2.00000
1	4.06667	4.80000	3.60000	3.06667
Total	3.70833	3.89583	2.54167	2.33333

DRS	R_MAN_CL	R_MAN_CO	R_NEG_CL	P_DESCH
0	3.09091	3.03030	2.39394	.09403
1	4.66667	2.53333	3.00000	.15580
Total	3.58333	2.87500	2.58333	.11333

DRS	P_DESCOM	P_INV_CL	P_NOMIN	P_REL
0	3.00000	4.03030	.25606	2.30303
1	3.00000	3.40000	.17200	3.20000
Total	3.00000	3.83333	.22979	2.58333

DRS	P_SELCRI	O_BUDGET	O_C_CLAM	O_CAP_CO
0	4.51515	1.10140	.71864	.85000
1	4.93333	1.11280	3.19447	.86333
Total	4.64583	1.10496	1.49233	.85417

DRS	O_CLEXP	O_COEXP	O_PRWKRE	E_INFL
0	7.15152	3.84848	3.24242	.84906
1	7.06667	2.60000	.93333	.82983
Total	7.12500	3.45833	2.52083	.84305

DRS	E_INTRAT	E_TENIN
0	8.29494	6.22148
1	8.42073	2.75013
Total	8.33425	5.13669

Group standard deviations

DRS	R_ADR	R_ADV_CL	R_ADV_CO	R_EQUAB
0	1.82470	.79177	1.27772	1.73205
1	2.05866	1.80739	2.02837	1.72654
Total	1.92950	1.25460	1.77252	1.71301

DRS	R_FUT_CL	R_FUT_CO	R_INC_CL	R_INC_CO
0	1.71557	1.62252	1.27327	1.11803
1	1.66762	1.26491	1.80476	1.79151
Total	1.70054	1.62742	1.61058	1.43413

DRS	R_MAN_CL	R_MAN_CO	R_NEG_CL	P_DESCH
0	1.56851	1.53062	1.22320	.06323
1	1.29099	1.24595	1.41421	.07283
Total	1.64812	1.45317	1.30194	.07169

DRS	P_DESCOM	P_INV_CL	P_NOMIN	P_REL
0	1.27475	1.23705	.21823	1.26206
1	1.19523	1.45406	.28456	1.20712
Total	1.23771	1.32622	.24103	1.30194

DRS	P_SELCRI	O_BUDGET	O_C_CLAM	O_CAP_CO
0	1.50252	.15225	.73667	.26041
1	.79881	.14299	8.61436	.23939
Total	1.32873	.14799	4.88044	.25156

DRS	O_CLEXP	O_COEXP	O_PRWKRE	E_INFL
0	7.04504	2.98037	4.30138	.11503
1	6.83966	2.50143	1.38701	.10637
Total	6.90860	2.87290	3.78682	.11163

DRS	E_INTRAT	E_TENIN
0	.72658	3.62562
1	1.60452	3.52491
Total	1.06291	3.91088

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 46 degrees of freedom

Variable	Wilks' Lambda	F	Significance
R_ADR	.94799	2.5236	.1190
R_ADV_CL	.88936	5.7227	.0209
R_ADV_CO	.74385	15.8401	.0002
R_EQUAB	.99867	.0612	.8057
R_FUT_CL	.97939	.9681	.3303
R_FUT_CO	.85671	7.6938	.0080
R_INC_CL	.79955	11.5322	.0014
R_INC_CO	.87862	6.3548	.0152
R_MAN_CL	.79943	11.5410	.0014
R_MAN_CO	.97434	1.2116	.2768
R_NEG_CL	.95245	2.2963	.1365
P_DESCH	.83709	8.9520	.0044
P_DESCOM	1.00000	.0000	1.0000
P_INV_CL	.95044	2.3986	.1283
P_NOMIN	.97331	1.2613	.2672
P_REL	.89585	5.3477	.0253
P_SELCRI	.97827	1.0219	.3173
O_BUDGET	.99870	.0599	.8077
O_C_CLAM	.94353	2.7529	.1039
O_CAP_CO	.99938	.0284	.8670
O_CLEXP	.99997	.0015	.9690
O_COEXP	.95856	1.9885	.1652
O_PRWKRE	.91842	4.0862	.0491
E_INFL	.99349	.3014	.5857
E_INTRAT	.99693	.1418	.7082
E_TENIN	.82713	9.6139	.0033

- - - - - - - - D I S C R I M I N A N T   A N A L Y S I S - - - - - - - -

On groups defined by DRS   DISPUTE RESOLUTION SATISFACTION

Analysis number 1

Stepwise variable selection
    Selection rule: maximize minimum Mahalanobis distance (D squared) between groups
    Maximum number of steps.................. 52
    Minimum tolerance level.................. .00100
    Minimum F to enter....................... 1.00000
    Maximum F to remove...................... .90000

Canonical Discriminant Functions

    Maximum number of functions.............. 1
    Minimum cumulative percent of variance... 100.00
    Maximum significance of Wilks' Lambda.... 1.0000

Prior probabilities

Group	Prior	Label
0	.68750	
1	.31250	
Total	1.00000	

---------------- Variables in the Analysis after Step 16 ----------------

Variable	Tolerance	F to Remove	D Squared	Between Groups	
R_ADV_CL	.7557762	2.8781	12.9876272	0	1
R_FUT_CL	.3435733	1.2823	13.7998300	0	1
R_FUT_CO	.3078271	3.2087	12.8283147	0	1
R_INC_CL	.5527542	8.9651	10.4568024	0	1
R_MAN_CL	.5804314	12.0341	9.4402076	0	1
P_DESCH	.8253581	2.9428	12.9562221	0	1
P_DESCOM	.5681459	6.4069	11.4251984	0	1
P_REL	.6476997	3.9457	12.4834364	0	1
P_SELCRI	.6033205	2.3812	13.2326653	0	1
O_C_CLAM	.7897618	4.5962	12.1902749	0	1
O_CLEXP	.4893454	9.4098	10.3003755	0	1
O_COEXP	.6778168	5.3587	11.8592929	0	1
E_INTRAT	.7147642	1.9209	13.4659247	0	1
E_TENIN	.7522088	6.2206	11.5006455	0	1

---------------- Variables not in the Analysis after Step 16 ----------------

Variable	Tolerance	Minimum Tolerance	F to Enter	D Squared	Between Groups	
R_ADR	.4632693	.2436674	.5386472	14.8287096	0	1
R_ADV_CO	.6334815	.3057868	.1846606	14.6188619	0	1
R_EQUAB	.9100780	.3076683	.0760323	14.5544657	0	1
R_INC_CO	.5295352	.2882081	.1947096	14.6248191	0	1
R_MAN_CO	.6596958	.2916919	.2466429	14.6556058	0	1
R_NEG_CL	.5326979	.3047328	.4031176	14.7483659	0	1
P_INV_CL	.7135588	.3072533	.1578267	14.6029544	0	1
P_NOMIN	.5825478	.2955437	.0001426	14.5094773	0	1
O_BUDGET	.6462821	.3075256	.7207451	14.9366595	0	1
O_CAP_CO	.6360153	.2874377	.2395358	14.6513926	0	1
O_PRWKRE	.3657310	.3006776	.0296564	14.5269735	0	1
E_INFL	.4894121	.3074838	.5860036	14.8567830	0	1

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered	Action Removed	Vars in	Wilks' Lambda	Sig.	Minimum D Squared	Sig.	Between Groups	
1	R_ADV_CO		1	.74385	.0002	1.53601	.0002	0	1
2	R_FUT_CO		2	.63947	.0000	2.51486	.0000	0	1
3	R_MAN_CL		3	.55512	.0000	3.57485	.0000	0	1
4	P_DESCH		4	.51355	.0000	4.22530	.0000	0	1
5	E_TENIN		5	.46988	.0000	5.03254	.0000	0	1
6	P_DESCOM		6	.42374	.0000	6.06619	.0000	0	1
7	E_INTRAT		7	.38645	.0000	7.08205	.0000	0	1
8	R_INC_CL		8	.36738	.0000	7.68115	.0000	0	1
9	O_COEXP		9	.35175	.0000	8.22068	.0000	0	1
10	O_CLEXP		10	.32926	.0000	9.08697	.0000	0	1
11	R_FUT_CL		11	.30768	.0000	10.03673	.0000	0	1
12		R_ADV_CO	10	.31229	.0000	9.82316	.0000	0	1
13	O_C_CLAM		11	.29027	.0000	10.90667	.0000	0	1
14	R_ADV_CL		12	.27364	.0000	11.84037	.0000	0	1
15	P_REL		13	.25211	.0000	13.23267	.0000	0	1
16	P_SELCRI		14	.23514	.0000	14.50939	.0000	0	1

Classification function coefficients
(Fisher's linear discriminant functions)

DRS =	0	1
R_ADV_CL	1.0618919	2.2483796
R_FUT_CL	-.7695343	-1.6143284
R_FUT_CO	.9521845	2.4869938
R_INC_CL	3.5659020	5.4259502
R_MAN_CL	3.2533442	5.2373524
P_DESCH	19.2936289	39.9850486
P_DESCOM	-.5094068	-2.3717238
P_REL	-.7120380	.7078373
P_SELCRI	3.9123577	2.8172904
O_C_CLAM	.0077011	.3653077
O_CLEXP	.2979383	.7179195
O_COEXP	.2742066	-.4212570
E_INTRAT	9.9022777	11.0285968
E_TENIN	.1602781	-.3960005
(Constant)	-61.3503902	-84.3364501

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr		After Fcn	Wilks' Lambda	Chi-square	df	Sig
					:	0	.235140	56.455	14	.0000
1*	3.2528	100.00	100.00	.8746	:					

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
R_ADV_CL	.37252
R_FUT_CL	-.37728
R_FUT_CO	.61350
R_INC_CL	.71085
R_MAN_CL	.77583
P_DESCH	.36013
P_DESCOM	-.61167
P_REL	.46431
P_SELCRI	-.38190
O_C_CLAM	.44987
O_CLEXP	.76994
O_COEXP	-.51910
E_INTRAT	.31720
E_TENIN	-.52505

Structure matrix:

Pooled within-groups correlations between discriminating variables and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
R_ADV_CO	.39450
R_MAN_CL	.27772
R_INC_CL	.27762
R_INC_CO	.27099
E_TENIN	-.25348
P_DESCH	.24460
R_FUT_CO	.22676
R_ADV_CL	.19557
P_REL	.18905
E_INFL	-.15313
O_PRWKRE	-.14420
O_C_CLAM	.13564
O_BUDGET	-.11794
O_COEXP	-.11528
P_NOMIN	-.09365
O_CAP_CO	.09267
P_SELCRI	.08264
R_FUT_CL	.08044
R_EQUAB	-.07340
P_INV_CL	-.05878
E_INTRAT	.03078
R_NEG_CL	.03021
R_ADR	.02890
R_MAN_CO	-.00845
O_CLEXP	-.00319
P_DESCOM	.00000

Unstandardized canonical discriminant function coefficients

	Func 1
R_ADV_CL	.3114861
R_FUT_CL	-.2217820
R_FUT_CO	.4029302
R_INC_CL	.4883144
R_MAN_CL	.5208574
P_DESCH	5.4320739
P_DESCOM	-.4889101
P_REL	.3727568
P_SELCRI	-.2874857
O_C_CLAM	.0938817
O_CLEXP	.1102568
O_COEXP	-.1825786
E_INTRAT	.2956902
E_TENIN	-.1460386
(Constant)	-5.1132789

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	-1.19035
1	2.61877

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
0	14	.181171
1	14	-3.510087
Pooled within-groups covariance matrix	14	8.211544

Box's M	Approximate F	Degrees of freedom	Significance
421.07478	2.28057	105, 2505.7	.0000

Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0	**	1	.0923	.5133	0	.4867	.9352
2			0		0	.6394	.9981	1	.0019	-.7219
3			0		0	.5416	.9967	1	.0033	-.5799
4			0		0	.9528	.9997	1	.0003	-1.2495
5			0		0	.7235	.9988	1	.0012	-.8365
6			0		0	.7967	.9991	1	.0009	-.9327
7			0		0	.1451	1.0000	1	.0000	-2.6473
8			0		0	.9118	.9998	1	.0002	-1.3011
9			0		0	.9263	.9998	1	.0002	-1.2828
10			0		0	.6048	1.0000	1	.0000	-1.7079
11			0		0	.3478	1.0000	1	.0000	-2.1292
12			0		0	.3211	1.0000	1	.0000	-2.1825
13			0		0	.6604	.9983	1	.0017	-.7510
14			0		0	.3993	1.0000	1	.0000	-2.0332
15			0		0	.1377	1.0000	1	.0000	-2.6746
16			0		0	.5878	1.0000	1	.0000	-1.7323
17			0		0	.0264	1.0000	1	.0000	-3.4105
18			0		0	.2836	.9813	1	.0187	-.1181
19			0		0	.5622	.9971	1	.0029	-.6108
20			0		0	.5271	1.0000	1	.0000	-1.8229
21			0		0	.2992	.9835	1	.0165	-.1523
22			0		0	.0314	1.0000	1	.0000	-3.3427
23			0		0	.1415	.9200	1	.0800	.2799
24			0		0	.4507	.9943	1	.0057	-.4361
25			0		0	.3643	1.0000	1	.0000	-2.0976
26			0		0	.3916	.9917	1	.0083	-.3336
27			0		0	.3181	.9858	1	.0142	-.1920
28			0		0	.3682	.9902	1	.0098	-.2904
29			0		0	.7903	.9999	1	.0001	-1.4563
30			0		0	.6983	.9986	1	.0014	-.8027
31			0		0	.3913	.9917	1	.0083	-.3331
32			0		0	.3626	1.0000	1	.0000	-2.1008
33			0		0	.3392	.9879	1	.0121	-.2346
34			1		1	.6021	.9888	0	.0112	2.0973
35			1		1	.1603	.7537	0	.2463	1.2148
36			1		1	.6174	.9897	0	.0103	2.1192
37			1		1	.1607	.7546	0	.2454	1.2161
38			1		1	.2698	1.0000	0	.0000	3.7224
39			1		1	.4625	.9999	0	.0001	3.3536
40			1		1	.2072	1.0000	0	.0000	3.8801
41			1		1	.9262	.9989	0	.0011	2.7114
42			1		1	.1362	1.0000	0	.0000	4.1088
43			1		1	.7458	.9947	0	.0053	2.2945
44			1		1	.7678	.9995	0	.0005	2.9140
45			1		1	.9053	.9990	0	.0010	2.7377
46			1		1	.2928	.9212	0	.0788	1.5668
47			1		1	.7182	.9939	0	.0061	2.2579
48			1		1	.6398	.9997	0	.0003	3.0868

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

All-groups Stacked Histogram

Canonical Discriminant Function 1

```
      8 +                                                              +
        |                                                              |
 F      |                                                              |
 r    6 +                                                              +
 e      |                                                              |
 q      |                           1                                  |
 u      |                           1                                  |
 e    4 +                        1  1                                  +
 n      |                        1  1                                  |
 c      |              1 1       1 11               2                  |
 y      |              1 1       1 11               2                  |
      2 +          1   1 111 11  1111         2     2   22    2        +
        |          1   1 111 11  1111         2     2   22    2        |
        |          1   1 111 1111111 1       12  2 22   22  2 2 2      |
        |          1   1 111 1111111 1       12  2 22   22  2 2 2      |
     X---------+---------+---------+---------+---------+---------------X
    out      -4.0      -2.0        .0       2.0       4.0            out
 Class  111111111111111111111111111111111111122222222222222222222222222
 Centroids                        1                  2
```

Classification results -

Actual Group		No. of Cases	Predicted Group Membership 0	1
Group	0	33	32 97.0%	1 3.0%
Group	1	15	0 .0%	15 100.0%

Percent of "grouped" cases correctly classified: 97.92%

Classification processing summary

```
48 (Unweighted) cases were processed.
 0 cases were excluded for missing or out-of-range group codes.
 0 cases had at least one missing discriminating variable.
48 (Unweighted) cases were used for printed output.
```

Appendix J
MDA Model Development with 14 Selected Variables

-------- D I S C R I M I N A N T   A N A L Y S I S --------

On groups defined by DRS DISPUTE RESOLUTION SATISFACTION

48 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
48 (Unweighted) cases will be used in the analysis.

Number of cases by group

DRS	Number of cases Unweighted	Weighted	Label
0	33	33.0	
1	15	15.0	
Total	48	48.0	

Group means

DRS	E_TENIN	O_C_CLAM	O_COEXP	O_PRWKRE
0	6.22148	.71864	3.84848	3.24242
1	2.75013	3.19447	2.60000	.93333
Total	5.13669	1.49233	3.45833	2.52083

DRS	P_DESCH	P_INV_CL	P_REL	P_SELCRI
0	.09403	4.03030	2.30303	4.51515
1	.15580	3.40000	3.20000	4.93333
Total	.11333	3.83333	2.58333	4.64583

DRS	R_ADR	R_ADV_CL	R_FUT_CO	R_INC_CL
0	2.72727	1.24242	3.48485	2.06061
1	3.66667	2.13333	4.80000	3.60000
Total	3.02083	1.52083	3.89583	2.54167

DRS	R_MAN_CL	R_NEG_CL
0	3.09091	2.39394
1	4.66667	3.00000
Total	3.58333	2.58333

Group standard deviations

DRS	E_TENIN	O_C_CLAM	O_COEXP	O_PRWKRE
0	3.62562	.73667	2.98037	4.30138
1	3.52491	8.61436	2.50143	1.38701
Total	3.91088	4.88044	2.87290	3.78682

DRS	P_DESCH	P_INV_CL	P_REL	P_SELCRI
0	.06323	1.23705	1.26206	1.50252
1	.07283	1.45406	1.20712	.79881
Total	.07169	1.32622	1.30194	1.32873

DRS	R_ADR	R_ADV_CL	R_FUT_CO	R_INC_CL
0	1.82470	.79177	1.62252	1.27327
1	2.05866	1.80739	1.26491	1.80476
Total	1.92950	1.25460	1.62742	1.61058

DRS	R_MAN_CL	R_NEG_CL
0	1.56851	1.22320
1	1.29099	1.41421
Total	1.64812	1.30194

Pooled within-groups correlation matrix

	E_TENIN	O_C_CLAM	O_COEXP	O_PRWKRE	P_DESCH	P_INV_CL
E_TENIN	1.00000					
O_C_CLAM	.17917	1.00000				
O_COEXP	.13689	-.02140	1.00000			
O_PRWKRE	-.01779	.03375	.33103	1.00000		
P_DESCH	.10663	.09019	-.12537	.11178	1.00000	
P_INV_CL	.06308	.23300	-.27760	.13221	-.05390	1.00000
P_REL	-.02159	-.15593	.10874	-.35790	-.03888	-.15361
P_SELCRI	-.24283	-.00513	-.25800	-.42464	-.04559	.13630
R_ADR	.22827	-.14166	-.15044	-.10658	.02595	-.10272
R_ADV_CL	-.00652	-.05393	-.06386	-.17743	.09902	-.00059
R_FUT_CO	-.06944	.00272	.00113	-.22605	.07256	-.10143
R_INC_CL	.08984	-.20299	.20434	-.13387	.10401	-.28179
R_MAN_CL	.06912	.07282	.10500	-.06788	-.04427	-.13502
R_NEG_CL	.02317	-.03346	.29749	-.23141	-.03380	-.23822

	P_REL	P_SELCRI	R_ADR	R_ADV_CL	R_FUT_CO	R_INC_CL
P_REL	1.00000					
P_SELCRI	.04005	1.00000				
R_ADR	-.05765	-.07495	1.00000			
R_ADV_CL	-.08499	-.06825	.08470	1.00000		
R_FUT_CO	-.10601	.23170	.23581	-.00572	1.00000	
R_INC_CL	.01911	-.06105	.10652	-.23331	.38085	1.00000
R_MAN_CL	.25884	-.00965	.23173	.13350	-.14814	-.06198
R_NEG_CL	.43567	.28418	-.04862	-.14367	.02998	.25827

	R_MAN_CL	R_NEG_CL
R_MAN_CL	1.00000	
R_NEG_CL	.13430	1.00000

Wilks' Lambda (U-statistic) and univariate F-ratio
with 1 and 46 degrees of freedom

Variable	Wilks' Lambda	F	Significance
E_TENIN	.82713	9.6139	.0033
O_C_CLAM	.94353	2.7529	.1039
O_COEXP	.95856	1.9885	.1652
O_PRWKRE	.91842	4.0862	.0491
P_DESCH	.83709	8.9520	.0044
P_INV_CL	.95044	2.3986	.1283

Variable	Wilks' Lambda	F	Significance
P_REL	.89585	5.3477	.0253
P_SELCRI	.97827	1.0219	.3173
R_ADR	.94799	2.5236	.1190
R_ADV_CL	.88936	5.7227	.0209
R_FUT_CO	.85671	7.6938	.0080
R_INC_CL	.79955	11.5322	.0014
R_MAN_CL	.79943	11.5410	.0014
R_NEG_CL	.95245	2.2963	.1365

-------- D I S C R I M I N A N T   A N A L Y S I S --------

On groups defined by DRS   DISPUTE RESOLUTION SATISFACTION

Analysis number 1

Stepwise variable selection
Selection rule: maximize minimum Mahalanobis distance (D squared) between groups
Maximum number of steps.................. 28
Minimum tolerance level.................. .00100
Minimum F to enter....................... 1.00000
Maximum F to remove...................... .90000

Canonical Discriminant Functions

Maximum number of functions.............. 1
Minimum cumulative percent of variance... 100.00
Maximum significance of Wilks' Lambda.... 1.0000

Prior probabilities

Group	Prior	Label
0	.68750	
1	.31250	
Total	1.00000	

---------------- Variables in the Analysis after Step 8 ----------------

Variable	Tolerance	F to Remove	D Squared	Between Groups	
E_TENIN	.8848761	9.4633	4.7586639	0	1
O_C_CLAM	.8218480	5.1560	5.6579781	0	1
P_DESCH	.9467393	2.0001	6.4368194	0	1
P_REL	.8622277	2.1065	6.4086285	0	1
R_ADR	.8332097	1.2298	6.6454967	0	1
R_ADV_CL	.8784619	3.3499	6.0895034	0	1
R_INC_CL	.8577859	8.9010	4.8668814	0	1
R_MAN_CL	.8218150	1.4509	6.5847785	0	1

---------------- Variables not in the Analysis after Step 8 ----------------

Variable	Tolerance	Minimum Tolerance	F to Enter	D Squared	Between Groups	
O_COEXP	.8492960	.7847882	.6933433	7.2047294	0	1
O_PRWKRE	.7434663	.7085747	.0012613	6.9960793	0	1
P_INV_CL	.8449122	.8021991	.0358072	7.0064943	0	1
P_SELCRI	.9312099	.8212409	.0890656	7.0225507	0	1
R_FUT_CO	.7270610	.7138968	.0885280	7.0223886	0	1
R_NEG_CL	.7327684	.7131547	.0513346	7.0111755	0	1

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered	Removed	Vars in	Wilks' Lambda	Sig.	Minimum D Squared	Sig.	Between Groups	
1	R_MAN_CL		1	.79943	.0014	1.11912	.0014	0	1
2	R_INC_CL		2	.65158	.0001	2.38523	.0001	0	1
3	E_TENIN		3	.54567	.0000	3.71387	.0000	0	1
4	P_DESCH		4	.48707	.0000	4.69744	.0000	0	1
5	O_C_CLAM		5	.45284	.0000	5.38965	.0000	0	1
6	R_ADV_CL		6	.41922	.0000	6.17972	.0000	0	1
7	P_REL		7	.40164	.0000	6.64550	.0000	0	1
8	R_ADR		8	.38936	.0000	6.99570	.0000	0	1

Classification function coefficients
(Fisher's linear discriminant functions)

DRS =	0	1
E_TENIN	.3256021	-.1166438
O_C_CLAM	.1077059	.3739494
P_DESCH	16.1146532	27.7036511
P_REL	1.4276818	2.0901365
R_ADR	.3913294	.7327313
R_ADV_CL	1.0431419	1.8923918
R_INC_CL	1.0734335	2.1556238
R_MAN_CL	.8738899	1.3486145
(Constant)	-7.4660508	-17.4911569

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr		After Fcn	Wilks' Lambda	Chi-square	df	Sig
					:	0	.389358	39.617	8	.0000
1*	1.5683	100.00	100.00	.7814	:					

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
E_TENIN	-.60115
O_C_CLAM	.48236
P_DESCH	.29049
P_REL	.31197
R_ADR	.24511
R_ADV_CL	.38400
R_INC_CL	.59561
R_MAN_CL	.26735

Structure matrix:

Pooled within-groups correlations between discriminating variables
and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
R_MAN_CL	.39997
R_INC_CL	.39981
E_TENIN	-.36505
P_DESCH	.35226
R_ADV_CL	.28165
R_FUT_CO	.27390
P_REL	.27226
O_PRWKRE	-.24435
R_NEG_CL	.21867
P_INV_CL	-.21845
O_C_CLAM	.19534
R_ADR	.18703
P_SELCRI	.05923
O_COEXP	-.00672

Unstandardized canonical discriminant function coefficients

	Func 1
E_TENIN	-.1672046
O_C_CLAM	.1006615
P_DESCH	4.3815758
P_REL	.2504613
R_ADR	.1290774
R_ADV_CL	.3210849
R_INC_CL	.4091552
R_MAN_CL	.1794842
(Constant)	-2.9962721

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	-.82654
1	1.81840

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
0	8	-1.931159
1	8	3.906843
Pooled within-groups covariance matrix	8	3.343830

Box's M	Approximate F	Degrees of freedom		Significance
160.91749	3.39821	36,	2680.2	.0000

Case Number	Mis Val	Sel	Actual Group		Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0	**	1	.4762	.6953	0	.3047	1.1059
2			0		0	.1448	.6057	1	.3943	.6318
3			0		0	.2116	.7276	1	.2724	.4227
4			0		0	.3378	.8521	1	.1479	.1319
5			0		0	.3379	.8522	1	.1478	.1317
6			0		0	.3103	.8324	1	.1676	.1881
7			0		0	.3324	.9989	1	.0011	-1.7958
8			0		0	.4501	.9981	1	.0019	-1.5818
9			0		0	.6032	.9484	1	.0516	-.3068
10			0		0	.9658	.9848	1	.0152	-.7837
11			0		0	.2720	.9992	1	.0008	-1.9250
12			0		0	.4399	.9982	1	.0018	-1.5990
13			0		0	.1980	.9995	1	.0005	-2.1139
14			0		0	.3201	.9990	1	.0010	-1.8209
15			0		0	.0473	.9999	1	.0001	-2.8104
16			0		0	.4887	.9978	1	.0022	-1.5189
17			0		0	.0470	.9999	1	.0001	-2.8132
18			0		0	.5879	.9455	1	.0545	-.2847
19			0		0	.3509	.8604	1	.1396	.1063
20			0		0	.6109	.9964	1	.0036	-1.3353
21			0		0	.4077	.9985	1	.0015	-1.6544
22			0		0	.4428	.9982	1	.0018	-1.5941
23			0	**	1	.3284	.5310	0	.4690	.8410
24			0		0	.7195	.9657	1	.0343	-.4674
25			0		0	.7334	.9944	1	.0056	-1.1671
26			0		0	.5008	.9245	1	.0755	-.1533
27			0		0	.1089	.9998	1	.0002	-2.4296
28			0		0	.7038	.9638	1	.0362	-.4463
29			0		0	.5409	.9973	1	.0027	-1.4380
30			0		0	.4593	.9113	1	.0887	-.0866
31			0		0	.9698	.9877	1	.0123	-.8644
32			0		0	.8717	.9793	1	.0207	-.6650
33			0	**	1	.3182	.5173	0	.4827	.8203
34			1		1	.3618	.5738	0	.4262	.9064
35			1		1	.9539	.9460	0	.0540	1.8762
36			1		1	.6455	.9807	0	.0193	2.2785
37			1	**	0	.4814	.9186	1	.0814	-.1225
38			1		1	.6225	.9822	0	.0178	2.3107
39			1		1	.9980	.9372	0	.0628	1.8158
40			1		1	.3674	.9939	0	.0061	2.7198
41			1		1	.8616	.9597	0	.0403	1.9927
42			1		1	.4105	.9925	0	.0075	2.6414
43			1		1	.9219	.9206	0	.0794	1.7204
44			1		1	.8846	.9566	0	.0434	1.9636
45			1		1	.9203	.9202	0	.0798	1.7183
46			1		1	.7153	.8513	0	.1487	1.4537
47			1		1	.4510	.6716	0	.3284	1.0646
48			1		1	.2636	.9966	0	.0034	2.9363

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

All-groups Stacked Histogram

Canonical Discriminant Function 1

```
     8 +                                                            +
       |                                                            |
F      |                                                            |
r    6 +                                                            +
e      |                  1                                         |
q      |                  1                                         |
u    4 +                  1        1        2                       +
e      |                  1        1        2                       |
n      |                  1     12 1        2                       |
c      |                  1     12 1        2                       |
y    2 +           1     111  1 11 1  12   22                       +
       |           1     111  1 11 1  12   22                       |
       |           1 1111111  11111111212  2222222                  |
       |           1 1111111  11111111212  2222222                  |
       X---------+---------+---------+---------+---------+----------X
      out      -4.0      -2.0        .0       2.0       4.0        out
   Class  1111111111111111111111111111111111111111122222222222222222222222222222
Centroids                              1             2
```

Classification results -

Actual Group		No. of Cases	Predicted Group Membership 0	1
Group	0	33	30 90.9%	3 9.1%
Group	1	15	1 6.7%	14 93.3%

Percent of "grouped" cases correctly classified: 91.67%

Appendix K
Classification of Hold-out Sample Cut-off Score by Troy's Method

Calculation of Discrimnant Scores - Hold-Out Sample					
Holdout-1					
E_TENIN	-0.1672046		4.488	-0.75041424	
O_C_CLAM	0.1006615		0 203	0 02043428	
P_DESCH	4.3815758		0.3	1.31447274	
P_REL	0 2504613		3	0.7513839	
R-ADR	0.1290774		2	0.2581548	
R_ADV_CL	0.3210849		1	0.3210849	
R_INC_CL	0.4091552		1	0.4091552	
R_MAN_CL	0.1794842		3	0.5384526	
	-2 9962721			2.86272418	
				-0.13354792	< 0.6947
			0		CORRECT
Holdout-2					
E_TENIN	-0.1672046		-0.176	0.02942801	
O_C_CLA1	0.1006615		0.69	0 06945644	
P_DESCH	4.3815758		0.14	0.61342061	
P_REL	0 2504613		1	0.2504613	
R-ADR	0.1290774		3	0.3872322	
R_ADV_CL	0.3210849		2	0.6421698	
R_INC_CL	0.4091552		3	1.2274656	
R_MAN_CL	0.1794842		3	0.5384526	
	-2.9962721			3.75808656	
				0.76181446	>.697
			0		INCORREC
Holdout-3					
E_TENIN	-0.1672046		2.731	-0.45663576	
O_C_CLAM	0.1006615		0.935	0.0941185	
P_DESCH	4.3815758		0.057	0.24974982	
P_REL	0.2504613		1	0.2504613	
R-ADR	0.1290774		3	0.3872322	
R_ADV_CL	0.3210849		1	0.3210849	
R_INC_CL	0.4091552		2	0.8183104	
R_MAN_CL	0.1794842		5	0.897421	
	-2.9962721			2.56174236	
				-0.43452974	< 0 6947
			0		CORRECT
Holdout-4					
E_TENIN	-0.1672046		2.444	-0.40864804	
O_C_CLAM	0.1006615		3.125	0.31456719	
P_DESCH	4.3815758		0.13	0.56960485	
P_REL	0.2504613		1	0.2504613	
R-ADR	0.1290774		6	0.7744644	
R_ADV_CL	0.3210849		1	0.3210849	
R_INC_CL	0.4091552		1	0.4091552	
R_MAN_CL	0.1794842		3	0.5384526	
	-2.9962721			2.7691424	
				-0.2271297	< 0 6947
			0		CORRECT

Calculation of Discriminant Scores -Hold-Out Sample (Cont'd)					
Holdout-5					
E_TENIN	-0.1672046		4.786	-0 80024122	
O_C_CLAM	0.1006615		0.413	0.0415732	
P_DESCH	4.3815758		0.2	0.87631516	
P_REL	0.2504613		3	0.7513839	
R-ADR	0 1290774		1	0.1290774	
R_ADV_CL	0.3210849		1	0 3210849	
R_INC_CL	0.4091552		3	1.2274656	
R_MAN_CL	0.1794842		5	0 897421	
	-2.9962721			3.44407994	
				0.44780784	< 0 6947
			0		CORRECT
Holdout-6					
E_TENIN	-0.1672046		4.786	-0.80024122	
O_C_CLAM	0.1006615		0 413	0.0415732	
P_DESCH	4.3815758		0.2	0 87631516	
P_REL	0 2504613		4	1.0018452	
R-ADR	0.1290774		5	0.645387	
R_ADV_CL	0.3210849		3	0.9632547	
R_INC_CL	0 4091552		5	2.045776	
R_MAN_CL	0.1794842		5	0.897421	
	-2 9962721			5 67133104	
				2.67505894	> 0.6947
			0		INCORREC
Holdout-7					
E_TENIN	-0.1672046		7.813	-1.30636954	
O_C_CLAM	0.1006615		0.765	0 07700605	
P_DESCH	4.3815758		0.17	0.74486789	
P_REL	0.2504613		3	0.7513839	
R-ADR	0.1290774		3	0.3872322	
R_ADV_CL	0.3210849		6	1.9265094	
R_INC_CL	0.4091552		5	2.045776	
R_MAN_CL	0.1794842		5	0.897421	
	-2.9962721			5 52382689	
				2.52755479	> 0.6947
			0		INCORREC
Holdout-8					
E_TENIN	-0.1672046		9 407	-1.57289367	
O_C_CLAM	0.1006615		0	0	
P_DESCH	4.3815758		0.08	0.35052606	
P_REL	0.2504613		6	1.5027678	
R-ADR	0.1290774		6	0.7744644	
R_ADV_CL	0.3210849		1	0.3210849	
R_INC_CL	0.4091552		1	0.4091552	
R_MAN_CL	0.1794842		4	0.7179368	
	-2.9962721			2.50304149	
				-0.49323061	< 0 6947
			0		CORRECT

Calculation of Discriminant Scores - Hold-Out Sample (Cont'd)					
Holdout-9					
E_TENIN	-0.1672046		8 65	-1.44631979	
O_C_CLAM	0.1006615		0	0	
P_DESCH	4.3815758		0.11	0.48197334	
P_REL	0.2504613		3	0.7513839	
R-ADR	0.1290774		5	0.645387	
R_ADV_CL	0.3210849		2	0.6421698	
R_INC_CL	0.4091552		2	0.8183104	
R_MAN_CL	0.1794842		4	0.7179368	
	-2.9962721			2.61084145	
				-0.38543065	< 0.6947
			0		CORRECT
Holdout-10					
E_TENIN	-0.1672046		8.625	-1.44213968	
O_C_CLAM	0.1006615		0.015	0.00150992	
P_DESCH	4.3815758		0.13	0.56960485	
P_REL	0.2504613		4	1.0018452	
R-ADR	0.1290774		2	0.2581548	
R_ADV_CL	0.3210849		1	0.3210849	
R_INC_CL	0.4091552		5	2.045776	
R_MAN_CL	0.1794842		4	0.7179368	
	-2.9962721			3.4737728	
				0.4775007	< 0.6947
			1		INCORREC
Holdout-11					
E_TENIN	-0.1672046		8.238	-1.37743149	
O_C_CLAM	0.1006615		0.015	0.00150992	
P_DESCH	4.3815758		0.302	1.32323589	
R-ADR	0.1290774		2	0.2581548	
P_REL	0.2504613		5	1.2523065	
R_ADV_CL	0.3210849		4	1.2843396	
R_INC_CL	0.4091552		3	1.2274656	
R_MAN_CL	0.1794842		3	0.5384526	
	-2.9962721			4.50803342	
				1.51176132	> 0.6947
			1		CORRECT
Holdout-12					
E_TENIN	-0.1672046		7.5	-1.2540345	
O_C_CLAM	0.1006615		2	0.201323	
P_DESCH	4.3815758		0.125	0.54769698	
P_REL	0.2504613		4	1.0018452	
R-ADR	0.1290774		6	0.7744644	
R_ADV_CL	0.3210849		6	1.9265094	
R_INC_CL	0.4091552		6	2.4549312	
R_MAN_CL	0.1794842		6	1.0769052	
	-2.9962721			6.72964088	
				3.73336878	> 0.6947

			1		CORRECT
Calculation of Discriminant Scores - Hold-Out Sample (Cont'd)					
Holdout-13					
E_TENIN	-0.1672046		8.238	-1.37743149	
O_C_CLAM	0.1006615		0	0	
P_DESCH	4.3815758		0.28	1.22684122	
P_REL	0.2504613		3	0.7513839	
R-ADR	0.1290774		2	0.2581548	
R_ADV_CL	0.3210849		4	1.2843396	
R_INC_CL	0.4091552		4	1.6366208	
R_MAN_CL	0.1794842		4	0.7179368	
	-2.9962721			4.49784563	
				1.50157353	> 0.6947
			1		CORRECT
Summary of result					
Hit Rate					
Group 0					
6 out of 9 correct 67.67%					
Group 1					
3 out of 4 correct 75%					
Overall					
9 out of 13 correct 69.23%					

Sheet1

Calculation of Discriminant Scores - Hold-Out Sample (Cont'd)				
Holdout-9				
E_TENIN	-0.1672046	8.65	-1.44631979	
O_C_CLAM	0.1006615	0	0	
P_DESCH	4.3815758	0.11	0.48197334	
P_REL	0.2504613	3	0.7513839	
R-ADR	0.1290774	5	0.645387	
R_ADV_CL	0.3210849	2	0.6421698	
R_INC_CL	0.4091552	2	0.8183104	
R_MAN_CL	0.1794842	4	0.7179368	
	-2.9962721		2.61084145	
			-0.38543065	< 0.6947
		0		CORRECT
Holdout-10				
E_TENIN	-0.1672046	8 625	-1.44213968	
O_C_CLAM	0.1006615	0.015	0.00150992	
P_DESCH	4.3815758	0.13	0.56960485	
P_REL	0.2504613	4	1.0018452	
R-ADR	0.1290774	2	0.2581548	
R_ADV_CL	0.3210849	1	0.3210849	
R_INC_CL	0.4091552	5	2.045776	
R_MAN_CL	0.1794842	4	0.7179368	
	-2.9962721		3.4737728	
			0.4775007	< 0.6947
		1		INCORREC
Holdout-11				
E_TENIN	-0.1672046	8.238	-1.37743149	
O_C_CLAM	0.1006615	0.015	0.00150992	
P_DESCH	4.3815758	0.302	1.32323589	
R-ADR	0.1290774	2	0.2581548	
P_REL	0.2504613	5	1.2523065	
R_ADV_CL	0.3210849	4	1.2843396	
R_INC_CL	0.4091552	3	1.2274656	
R_MAN_CL	0.1794842	3	0.5384526	
	-2.9962721		4.50803342	
			1.51176132	> 0.6947
		1		CORRECT
Holdout-12				
E_TENIN	-0.1672046	7.5	-1.2540345	
O_C_CLAM	0.1006615	2	0.201323	
P_DESCH	4.3815758	0.125	0.54769698	
P_REL	0.2504613	4	1.0018452	
R-ADR	0.1290774	6	0.7744644	
R_ADV_CL	0.3210849	6	1.9265094	
R_INC_CL	0.4091552	6	2.4549312	
R_MAN_CL	0.1794842	6	1.0769052	
	-2.9962721		6.72964088	
			3.73336878	> 0 6947

Sheet1

		1		CORRECT
Calculation of Discriminant Scores - Hold-Out Sample (Cont'd)				
Holdout-13				
E_TENIN	-0.1672046	8.238	-1.37743149	
O_C_CLAM	0.1006615	0	0	
P_DESCH	4.3815758	0.28	1.22684122	
P_REL	0.2504613	3	0.7513839	
R-ADR	0.1290774	2	0.2581548	
R_ADV_CL	0.3210849	4	1.2843396	
R_INC_CL	0.4091552	4	1.6366208	
R_MAN_CL	0.1794842	4	0.7179368	
	-2.9962721		4.49784563	
			1.50157353	> 0.6947
		1		CORRECT
Summary of result				
Hit Rate				
Group 0				
6 out of 9 correct 67.67%				
Group 1				
3 out of 4 correct 75%				
Overall				
9 out of 13 correct 69.23%				

Appendix L
Classification of Hold-out Sample Cut-off Score by Method of Kleinbaum, Kupper and Muller

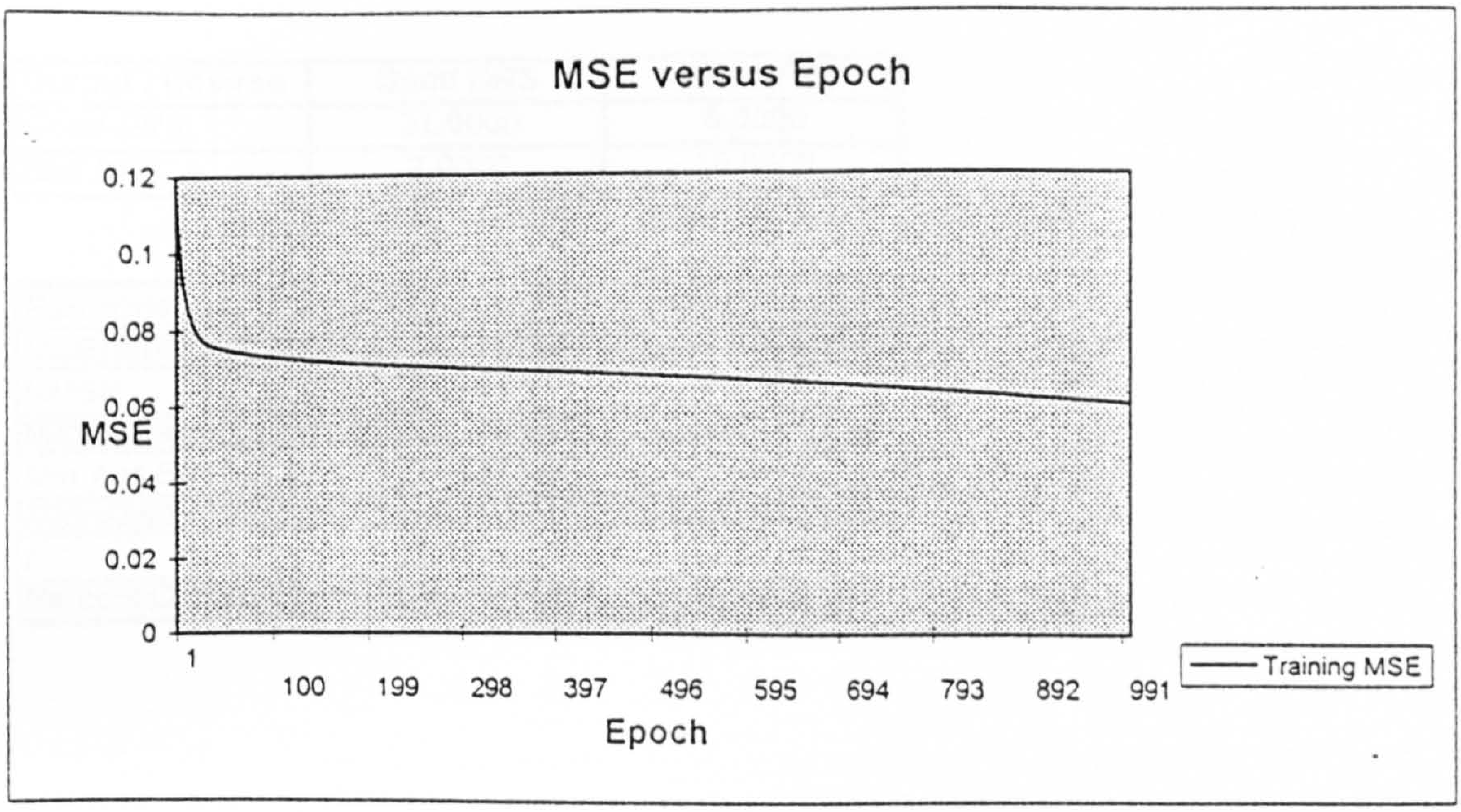
Calculation of Discrimnant Scores - Hold-Out Sample					
Holdout-1					
E_TENIN	-0.1672046		4.488	-0.75041424	
O_C_CLAM	0.1006615		0.203	0.02043428	
P_DESCH	4.3815758		0.3	1.31447274	
P_REL	0.2504613		3	0.7513839	
R-ADR	0.1290774		2	0.2581548	
R_ADV_CL	0.3210849		1	0.3210849	
R_INC_CL	0.4091552		1	0.4091552	
R_MAN_CL	0.1794842		3	0.5384526	
	-2.9962721			2.86272418	
				-0.13354792	< 0.7885
			0		CORRECT
Holdout-2					
E_TENIN	-0.1672046		-0.176	0.02942801	
O_C_CLA1	0.1006615		0.69	0.06945644	
P_DESCH	4.3815758		0.14	0.61342061	
P_REL	0.2504613		1	0.2504613	
R-ADR	0.1290774		3	0.3872322	
R_ADV_CL	0.3210849		2	0.6421698	
R_INC_CL	0.4091552		3	1.2274656	
R_MAN_CL	0.1794842		3	0.5384526	
	-2.9962721			3.75808656	
				0.76181446	<0.7885
			0		CORRECT
Holdout-3					
E_TENIN	-0.1672046		2.731	-0.45663576	
O_C_CLAM	0.1006615		0.935	0.0941185	
P_DESCH	4.3815758		0.057	0.24974982	
P_REL	0.2504613		1	0.2504613	
R-ADR	0.1290774		3	0.3872322	
R_ADV_CL	0.3210849		1	0.3210849	
R_INC_CL	0.4091552		2	0.8183104	
R_MAN_CL	0.1794842		5	0.897421	
	-2.9962721			2.56174236	
				-0.43452974	< 0.7885
			0		CORRECT
Holdout-4					
E_TENIN	-0.1672046		2.444	-0.40864804	
O_C_CLAM	0.1006615		3.125	0.31456719	
P_DESCH	4.3815758		0.13	0.56960485	
P_REL	0.2504613		1	0.2504613	
R-ADR	0.1290774		6	0.7744644	
R_ADV_CL	0.3210849		1	0.3210849	
R_INC_CL	0.4091552		1	0.4091552	
R_MAN_CL	0.1794842		3	0.5384526	
	-2.9962721			2.7691424	
				-0.2271297	< 0.7885
			0		CORRECT

Calculation of Discnminant Scores -Hold-Out Sample (Cont'd)					
Holdout-5					
E_TENIN	-0.1672046		4.786	-0.80024122	
O_C_CLAM	0.1006615		0.413	0.0415732	
P_DESCH	4.3815758		0.2	0.87631516	
P_REL	0.2504613		3	0.7513839	
R-ADR	0.1290774		1	0.1290774	
R_ADV_CL	0.3210849		1	0.3210849	
R_INC_CL	0.4091552		3	1.2274656	
R_MAN_CL	0.1794842		5	0.897421	
	-2.9962721			3.44407994	
				0 44780784	< 0.7885
			0		CORRECT
Holdout-6					
E_TENIN	-0.1672046		4.786	-0 80024122	
O_C_CLAM	0.1006615		0.413	0.0415732	
P_DESCH	4.3815758		0.2	0.87631516	
P_REL	0.2504613		4	1.0018452	
R-ADR	0.1290774		5	0.645387	
R_ADV_CL	0.3210849		3	0.9632547	
R_INC_CL	0.4091552		5	2.045776	
R_MAN_CL	0.1794842		5	0.897421	
	-2 9962721			5.67133104	
				2.67505894	> 0.7885
			0		INCORREC
Holdout-7					
E_TENIN	-0.1672046		7.813	-1.30636954	
O_C_CLAM	0.1006615		0.765	0.07700605	
P_DESCH	4.3815758		0.17	0.74486789	
P_REL	0.2504613		3	0.7513839	
R-ADR	0.1290774		3	0.3872322	
R_ADV_CL	0.3210849		6	1.9265094	
R_INC_CL	0 4091552		5	2.045776	
R_MAN_CL	0.1794842		5	0.897421	
	-2.9962721			5 52382689	
				2.52755479	> 0.7885
			0		INCORREC
Holdout-8					
E_TENIN	-0.1672046		9.407	-1.57289367	
O_C_CLAM	0.1006615		0	0	
P_DESCH	4.3815758		0 08	0.35052606	
P_REL	0.2504613		6	1.5027678	
R-ADR	0.1290774		6	0.7744644	
R_ADV_CL	0.3210849		1	0.3210849	
R_INC_CL	0.4091552		1	0.4091552	
R_MAN_CL	0.1794842		4	0.7179368	
	-2.9962721			2.50304149	
				-0.49323061	< 0 7885
			0		CORRECT

Calculation of Discriminant Scores - Hold-Out Sample (Cont'd)					
Holdout-9					
E_TENIN	-0.1672046		8.65	-1.44631979	
O_C_CLAM	0.1006615		0	0	
P_DESCH	4.3815758		0.11	0.48197334	
P_REL	0.2504613		3	0.7513839	
R-ADR	0.1290774		5	0.645387	
R_ADV_CL	0.3210849		2	0.6421698	
R_INC_CL	0.4091552		2	0.8183104	
R_MAN_CL	0.1794842		4	0.7179368	
	-2.9962721			2.61084145	
				-0.38543065	< 0.7885
			0		CORRECT
Holdout-10					
E_TENIN	-0.1672046		8.625	-1.44213968	
O_C_CLAM	0.1006615		0.015	0.00150992	
P_DESCH	4.3815758		0.13	0.56960485	
P_REL	0.2504613		4	1.0018452	
R-ADR	0.1290774		2	0.2581548	
R_ADV_CL	0.3210849		1	0.3210849	
R_INC_CL	0.4091552		5	2.045776	
R_MAN_CL	0.1794842		4	0.7179368	
	-2.9962721			3.4737728	
				0.4775007	< 0.7885
			1		INCORREC
Holdout-11					
E_TENIN	-0.1672046		8.238	-1.37743149	
O_C_CLAM	0.1006615		0.015	0.00150992	
P_DESCH	4.3815758		0.302	1.32323589	
R-ADR	0.1290774		2	0.2581548	
P_REL	0.2504613		5	1.2523065	
R_ADV_CL	0.3210849		4	1.2843396	
R_INC_CL	0.4091552		3	1.2274656	
R_MAN_CL	0.1794842		3	0.5384526	
	-2.9962721			4.50803342	
				1.51176132	> 0.7885
			1		CORRECT
Holdout-12					
E_TENIN	-0.1672046		7.5	-1.2540345	
O_C_CLAM	0.1006615		2	0.201323	
P_DESCH	4.3815758		0.125	0.54769698	
P_REL	0.2504613		4	1.0018452	
R-ADR	0.1290774		6	0.7744644	
R_ADV_CL	0.3210849		6	1.9265094	
R_INC_CL	0.4091552		6	2.4549312	
R_MAN_CL	0.1794842		6	1.0769052	
	-2.9962721			8.72964088	
				3.73336878	> 0.7885

			1		CORRECT
Calculation of Discriminant Scores - Hold-Out Sample (Cont'd)					
Holdout-13					
E_TENIN	-0.1672046		8.238	-1.37743149	
O_C_CLAM	0.1006615		0	0	
P_DESCH	4.3815758		0 28	1.22684122	
P_REL	0.2504613		3	0.7513839	
R-ADR	0.1290774		2	0.2581548	
R_ADV_CL	0.3210849		4	1.2843396	
R_INC_CL	0.4091552		4	1.6366208	
R_MAN_CL	0.1794842		4	0.7179368	
	-2.9962721			4.49784563	
				1.50157353	> 0.7885
			1		CORRECT
Summary of result					
Hit Rate					
Group 0					
7 out of 9 correct 77.78%					
Group 1					
3 out of 4 correct 75%					
Overall					
10 out of 13 correct 76.92%					

Appendix M
Training and Testing Results using One Hidden Layer
(Combination of Variables)



Best Network	*Training*
Epoch #	1000.0000
Minimum MSE	0.0602
Final MSE	0.0602

Test-ts-e-1-train Report

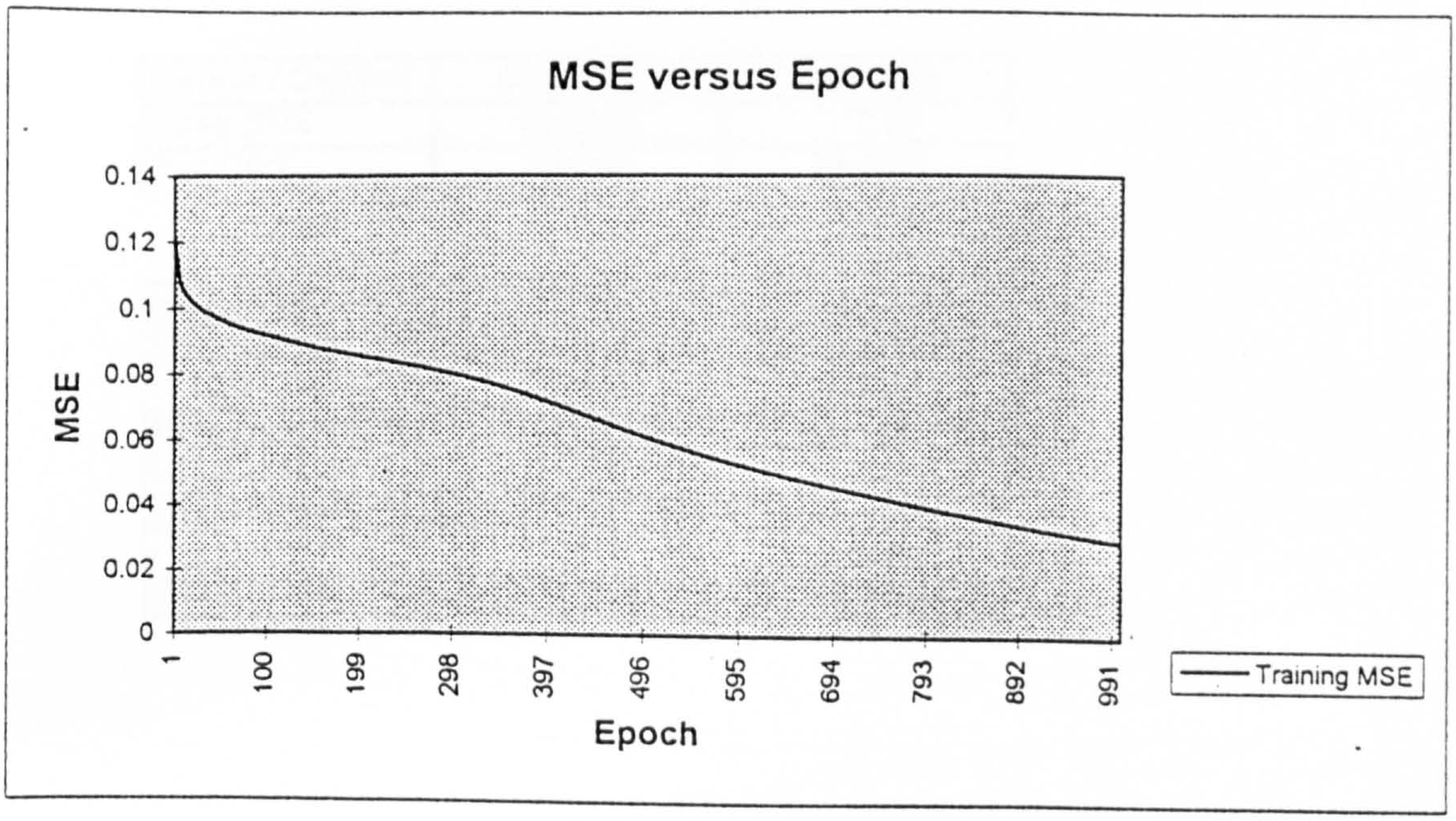
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	31.0000	5.0000
Bad DRS	2.0000	10.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.1174	0.1233
NMSE	0.5464	0.5739
MAE	0.2484	0.2344
Min Abs Error	0.0581	0.0391
Max Abs Error	0.9117	0.9615
r	0.6794	0.6575
Percent Correct	93.9394	66.6667

Test-ts-e-1-test Report

Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	6.0000	4.0000
Bad DRS	3.0000	0.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.3645	0.4003
NMSE	1.7112	1.8792
MAE	0.5193	0.5285
Min Abs Error	0.0715	0.0390
Max Abs Error	0.9001	0.9576
r	-0.4707	-0.5047
Percent Correct	66.6667	0.0000



Best Network	Training
Epoch #	1000.0000
Minimum MSE	0.0293
Final MSE	0.0293

Test-TS-O-1-TRAIN Report

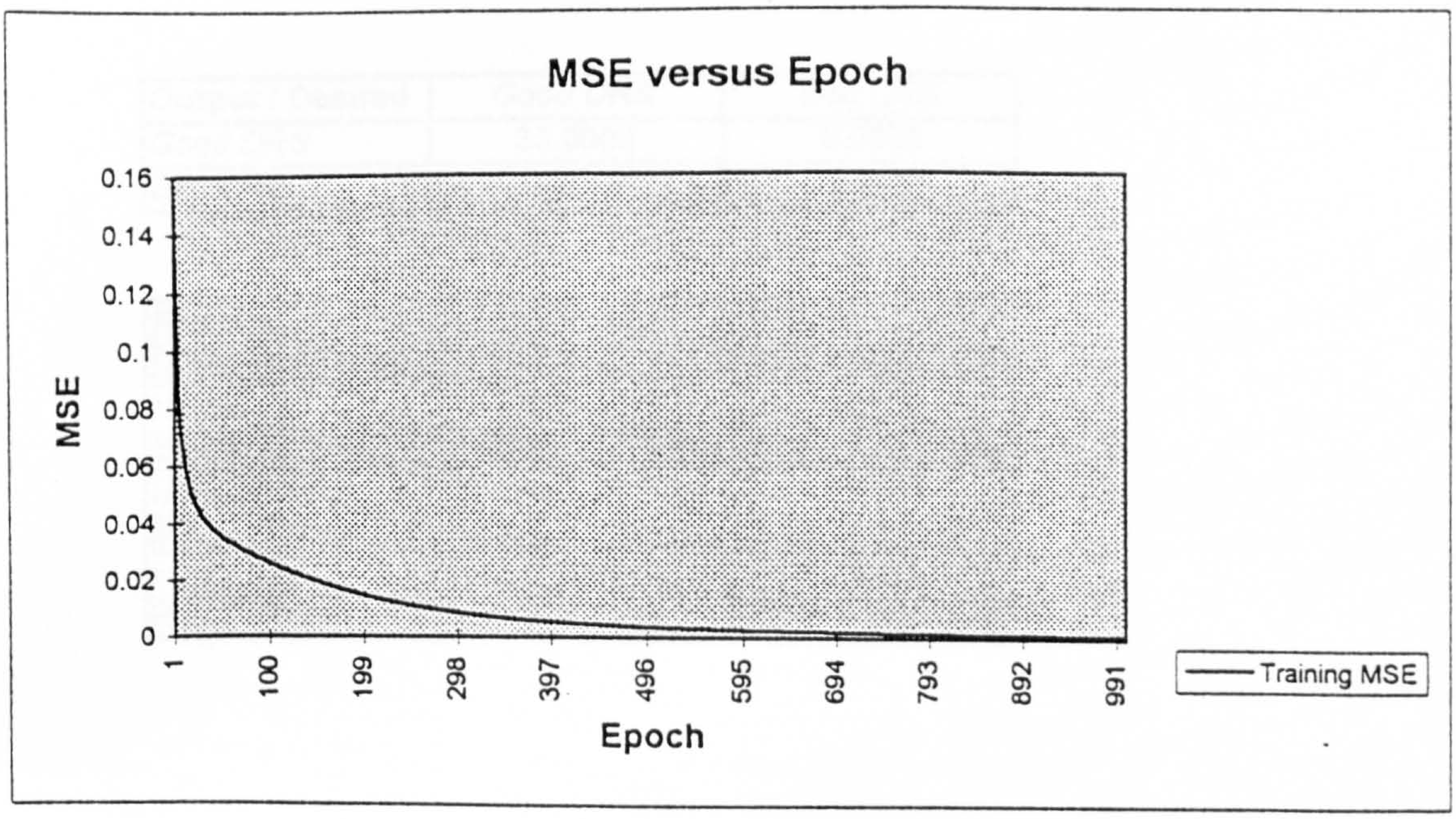
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	33.0000	1.0000
Bad DRS	0.0000	14.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.0584	0.0587
NMSE	0.2720	0.2732
MAE	0.1838	0.1836
Min Abs Error	0.0002	0.0002
Max Abs Error	0.7712	0.7853
r	0.8816	0.8804
Percent Correct	100.0000	93.3333

Test-TS-O-1-TEST Report

Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	8.0000	4.0000
Bad DRS	1.0000	0.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.2902	0.2862
NMSE	1.3624	1.3436
MAE	0.4077	0.4041
Min Abs Error	0.0124	0.0125
Max Abs Error	0.8991	0.8991
r	-0.0811	-0.0762
Percent Correct	88.8889	0.0000



Best Network	*Training*
Epoch #	1000.0000
Minimum MSE	0.0011
Final MSE	0.0011

Test-TS-P-1-TRAIN Report

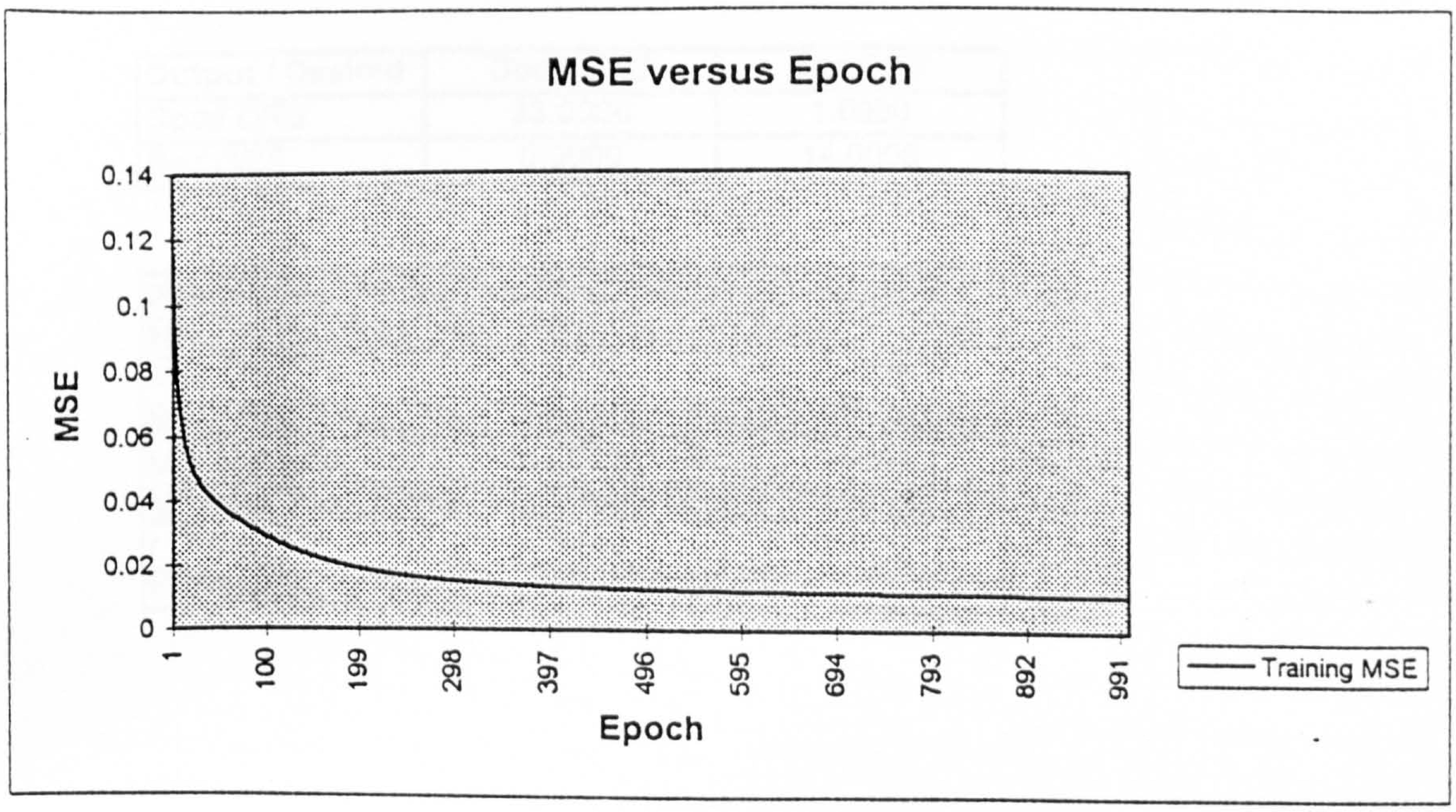
Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	Good DRS	Bad DRS
MSE	0.0022	0.0022
NMSE	0.0103	0.0104
MAE	0.0286	0.0282
Min Abs Error	0.0001	0.0000
Max Abs Error	0.1328	0.1347
r	0.9966	0.9965
Percent Correct	100.0000	100.0000

Test-TS-P-1-TEST Report

Output / Desired	Good DRS	Bad DRS
Good DRS	8.0000	2.0000
Bad DRS	1.0000	2.0000

Performance	Good DRS	Bad DRS
MSE	0.1389	0.1422
NMSE	0.6520	0.6676
MAE	0.2266	0.2285
Min Abs Error	0.0001	0.0000
Max Abs Error	0.8880	0.8936
r	0.6078	0.6000
Percent Correct	88.8889	50.0000



Best Network	Training
Epoch #	999.0000
Minimum MSE	0.0110
Final MSE	0.0110

Test-TS-R-1-TRAIN Report

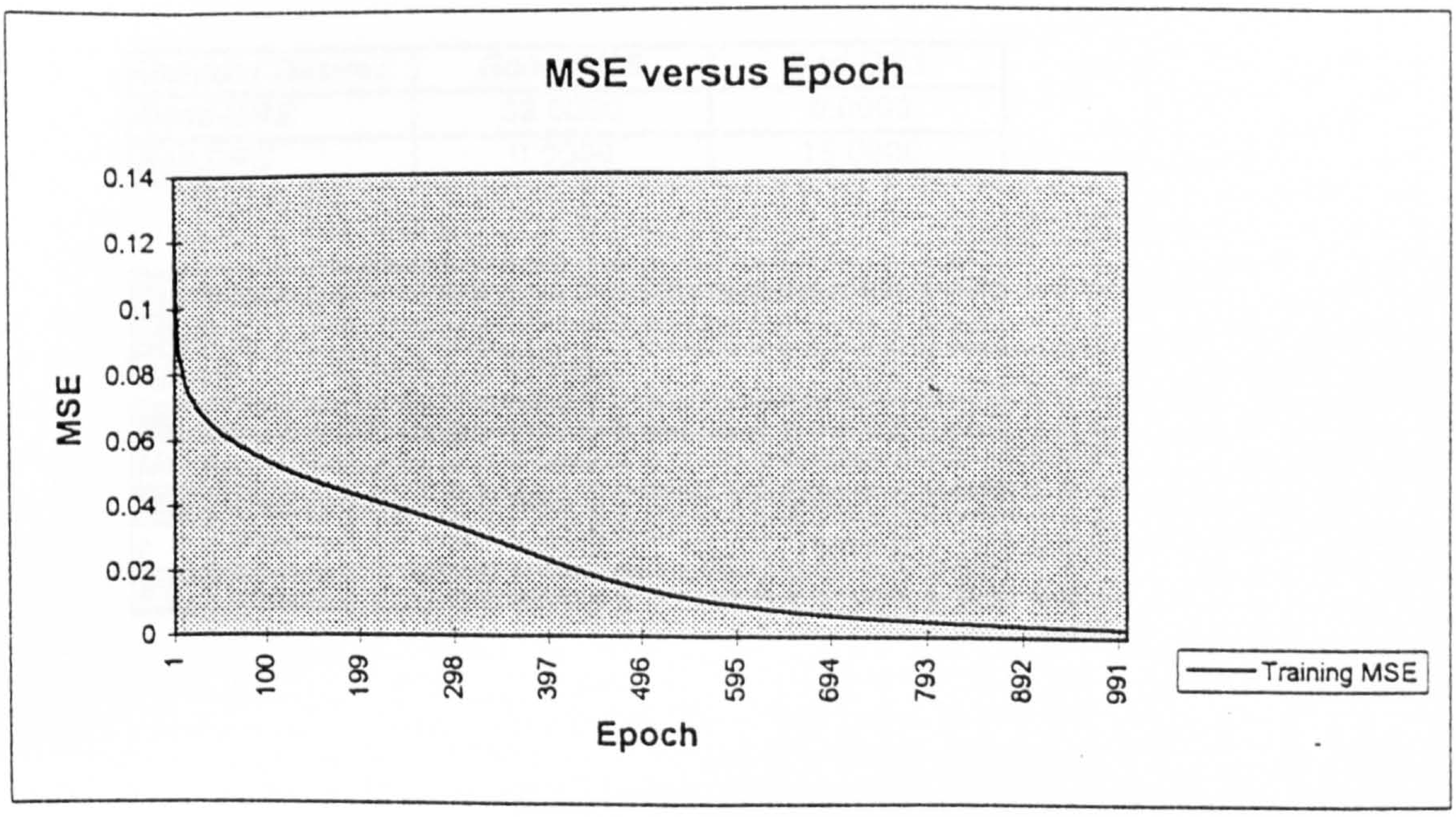
Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	1.0000
Bad DRS	0.0000	14.0000

Performance	Good DRS	Bad DRS
MSE	0.0221	0.0221
NMSE	0.1028	0.1028
MAE	0.0418	0.0426
Min Abs Error	0.0001	0.0001
Max Abs Error	0.9988	0.9981
r	0.9482	0.9482
Percent Correct	100.0000	93.3333

Test-TS-R-1-TEST Report

Output / Desired	Good DRS	Bad DRS
Good DRS	6.0000	3.0000
Bad DRS	3.0000	1.0000

Performance	Good DRS	Bad DRS
MSE	0.4431	0.4388
NMSE	2.0802	2.0599
MAE	0.4752	0.4689
Min Abs Error	0.0001	0.0001
Max Abs Error	0.9992	0.9994
r	-0.1021	-0.0928
Percent Correct	66.6667	25.0000



Best Network	Training
Epoch #	1000.0000
Minimum MSE	0.0027
Final MSE	0.0027

Test-E&O-1-TRAIN Report

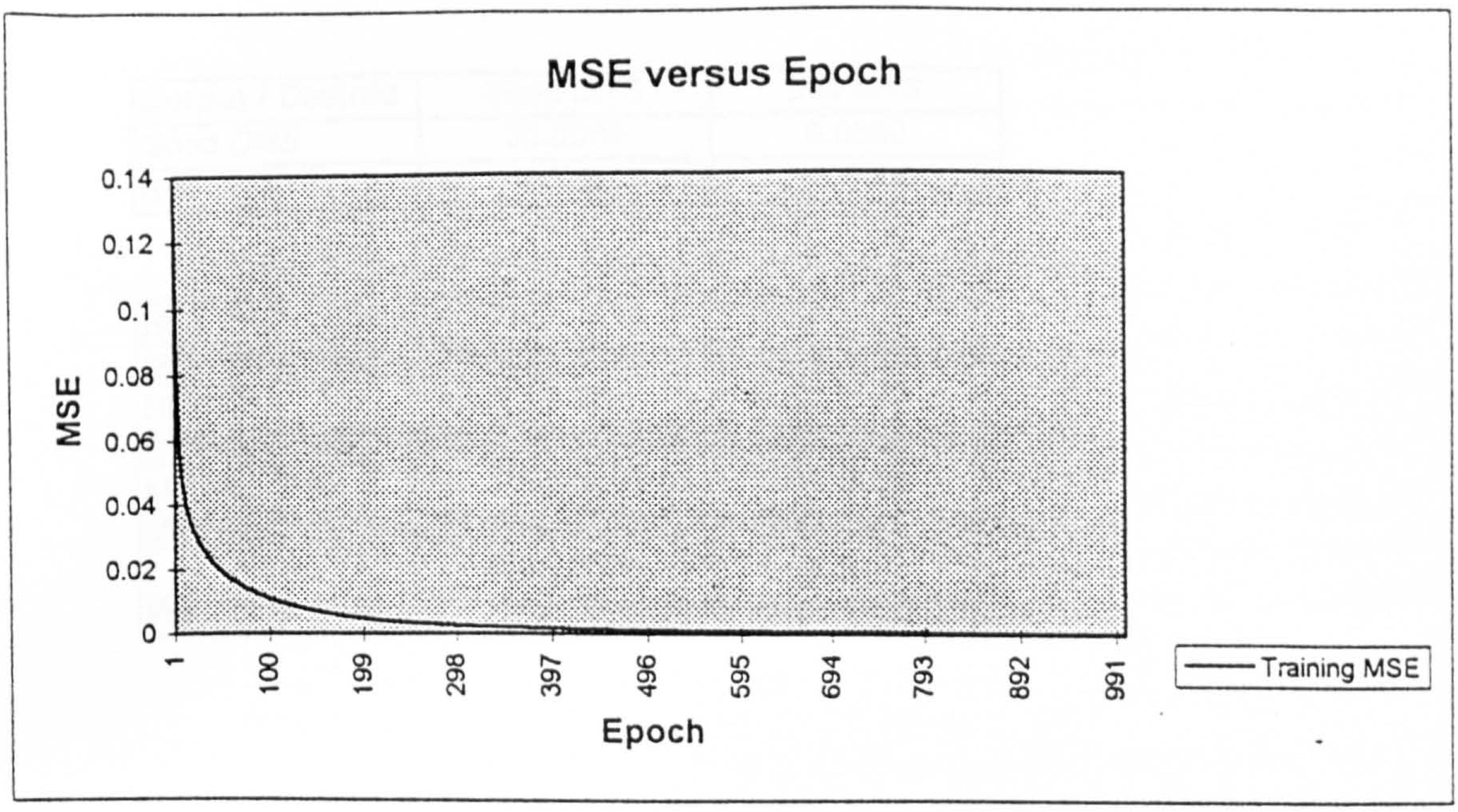
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.0053	0.0056
NMSE	0.0245	0.0260
MAE	0.0528	0.0554
Min Abs Error	0.0000	0.0000
Max Abs Error	0.1984	0.2139
r	0.9931	0.9929
Percent Correct	100.0000	100.0000

Test-E&O-1-TEST Report

Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	7.0000	4.0000
Bad DRS	2.0000	0.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.3354	0.3506
NMSE	1.5747	1.6460
MAE	0.4408	0.4550
Min Abs Error	0.0006	0.0016
Max Abs Error	0.9809	0.9829
r	-0.0998	-0.1705
Percent Correct	77.7778	0.0000



Best Network	Training
Epoch #	999.0000
Minimum MSE	0.0004
Final MSE	0.0004

Test-E&O-1-TRAIN Report

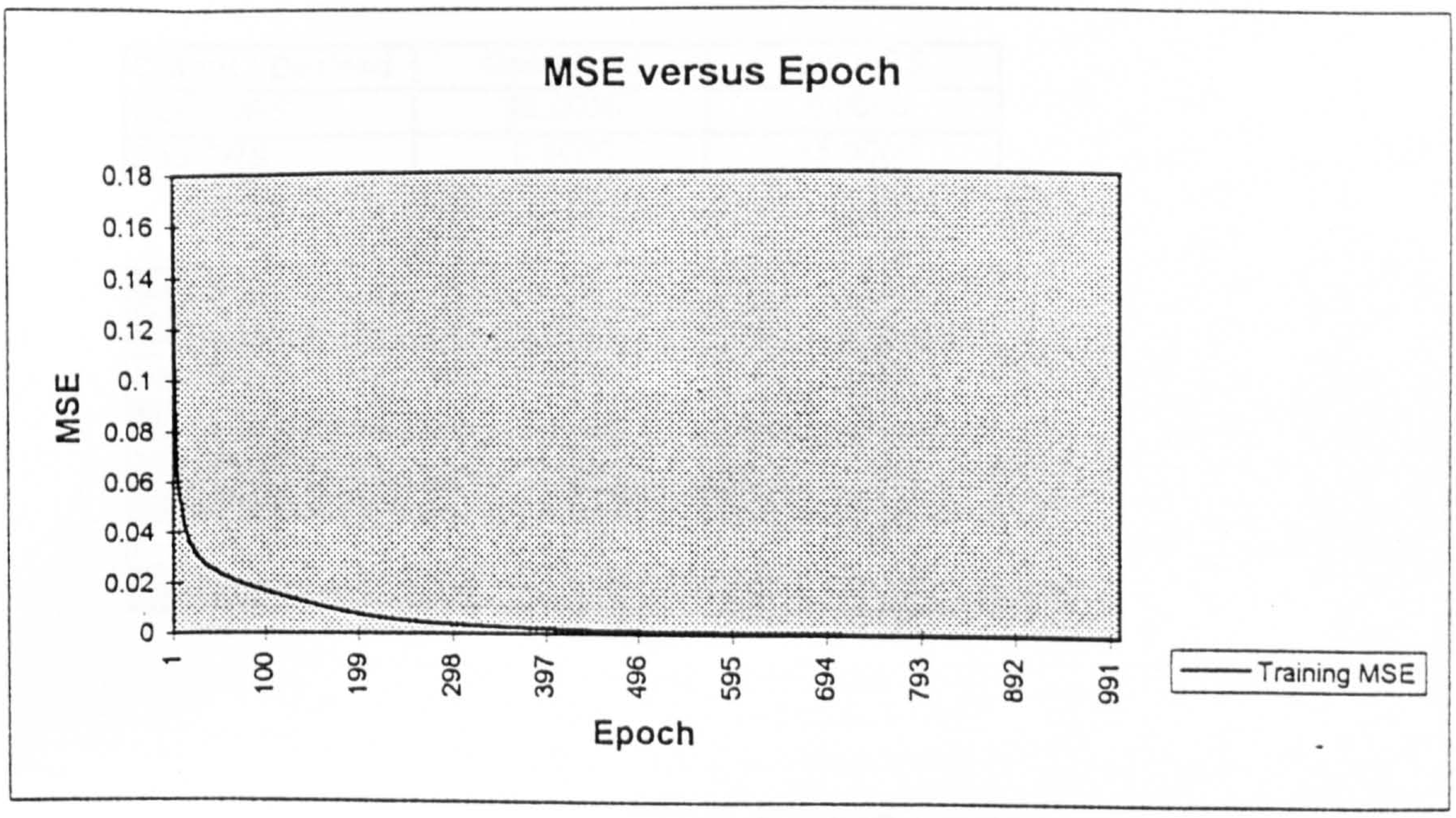
Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	Good DRS	Bad DRS
MSE	0.0009	0.0009
NMSE	0.0041	0.0043
MAE	0.0173	0.0177
Min Abs Error	0.0002	0.0002
Max Abs Error	0.0853	0.0903
r	0.9986	0.9985
Percent Correct	100.0000	100.0000

Test-E&O-1-TEST Report

Output / Desired	Good DRS	Bad DRS
Good DRS	8.0000	1.0000
Bad DRS	1.0000	3.0000

Performance	Good DRS	Bad DRS
MSE	0.1167	0.1070
NMSE	0.5479	0.5023
MAE	0.2014	0.1930
Min Abs Error	0.0003	0.0004
Max Abs Error	0.8613	0.8422
r	0.6778	0.7089
Percent Correct	88.8889	75.0000



Best Network	Training
Epoch #	999.0000
Minimum MSE	0.0005
Final MSE	0.0005

Test-E&R-1-TRAIN Report

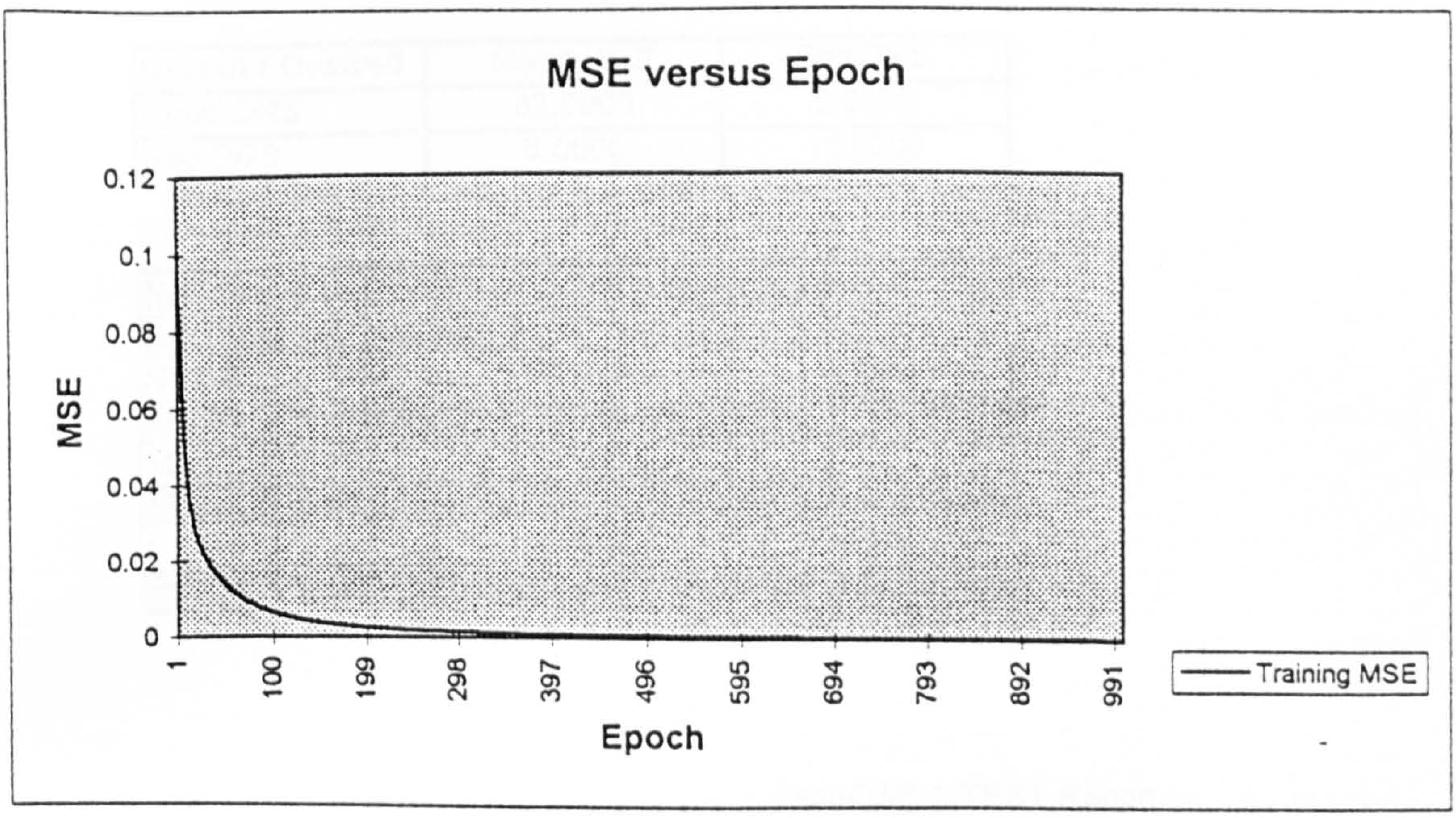
Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	Good DRS	Bad DRS
MSE	0.0010	0.0009
NMSE	0.0047	0.0040
MAE	0.0198	0.0192
Min Abs Error	0.0000	0.0000
Max Abs Error	0.1068	0.0940
r	0.9986	0.9989
Percent Correct	100.0000	100.0000

Test-E&R-1-TEST Report

Output / Desired	Good DRS	Bad DRS
Good DRS	7.0000	2.0000
Bad DRS	2.0000	2.0000

Performance	Good DRS	Bad DRS
MSE	0.3057	0.3177
NMSE	1.4351	1.4914
MAE	0.3540	0.3862
Min Abs Error	0.0001	0.0001
Max Abs Error	0.9937	0.9975
r	0.1811	0.1057
Percent Correct	77.7778	50.0000



Best Network	*Training*
Epoch #	998.0000
Minimum MSE	0.0003
Final MSE	0.0003

Test-O&P-1-TRAIN Report

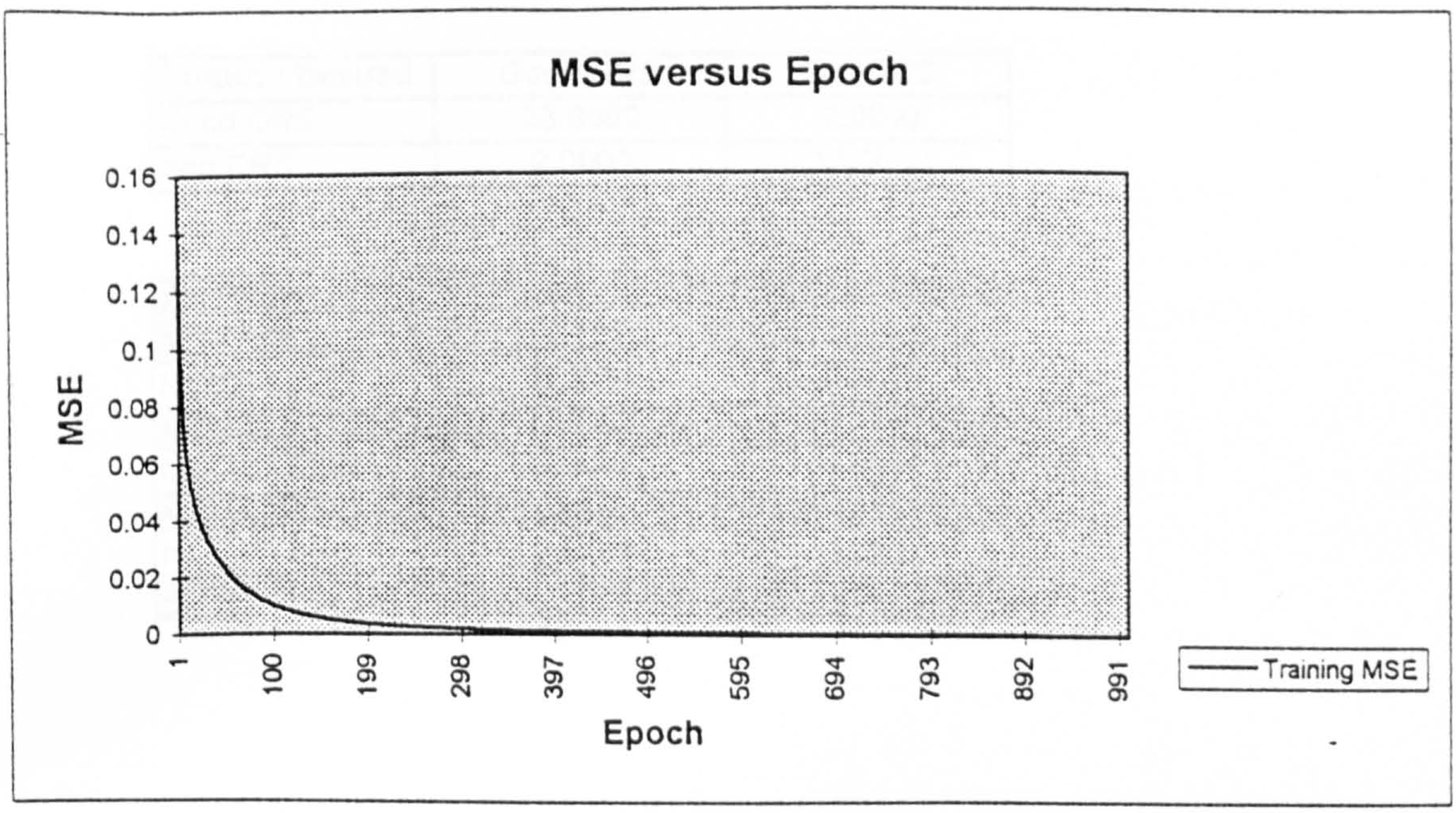
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.0006	0.0006
NMSE	0.0029	0.0028
MAE	0.0147	0.0142
Min Abs Error	0.0001	0.0001
Max Abs Error	0.0693	0.0735
r	0.9990	0.9991
Percent Correct	100.0000	100.0000

Test-O&P-1-TEST Report

Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	9.0000	2.0000
Bad DRS	0.0000	2.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.1161	0.1202
NMSE	0.5450	0.5643
MAE	0.1684	0.1709
Min Abs Error	0.0001	0.0001
Max Abs Error	0.8789	0.9104
r	0.7543	0.7334
Percent Correct	100.0000	50.0000



Best Network	*Training*
Epoch #	998.0000
Minimum MSE	0.0004
Final MSE	0.0004

Test-O&R-1-TRAIN Report

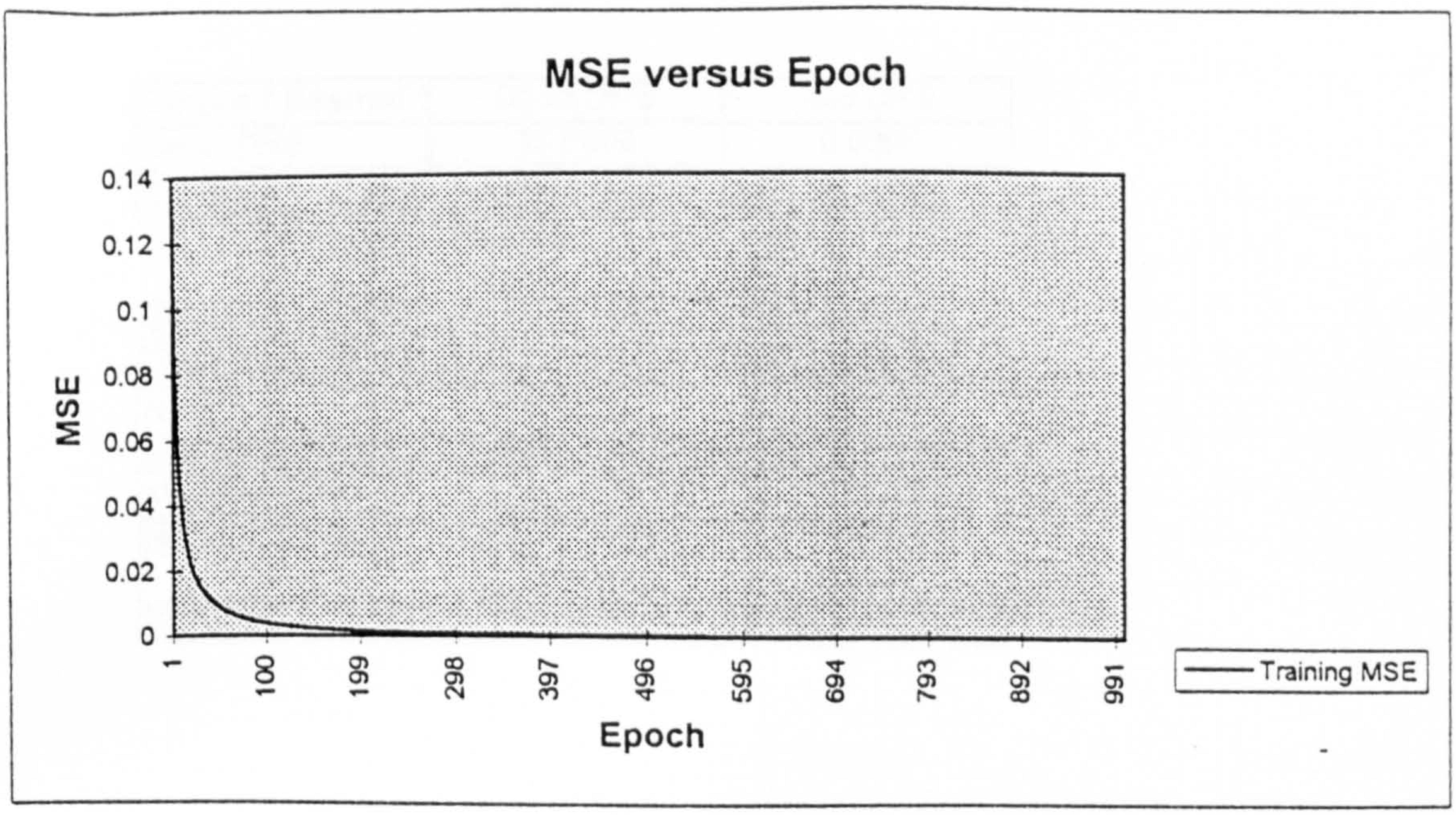
Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	Good DRS	Bad DRS
MSE	0.0008	0.0007
NMSE	0.0035	0.0033
MAE	0.0187	0.0188
Min Abs Error	0.0002	0.0001
Max Abs Error	0.0731	0.0662
r	0.9991	0.9992
Percent Correct	100.0000	100.0000

Test-O&R-1-TEST Report

Output / Desired	Good DRS	Bad DRS
Good DRS	8.0000	3.0000
Bad DRS	1.0000	1.0000

Performance	Good DRS	Bad DRS
MSE	0.2159	0.2296
NMSE	1.0136	1.0777
MAE	0.3053	0.3078
Min Abs Error	0.0003	0.0003
Max Abs Error	0.9961	0.9949
r	0.3664	0.3304
Percent Correct	88.8889	25.0000



Best Network	*Training*
Epoch #	996.0000
Minimum MSE	0.0002
Final MSE	0.0002

Test-P&R-1-TRAIN Report

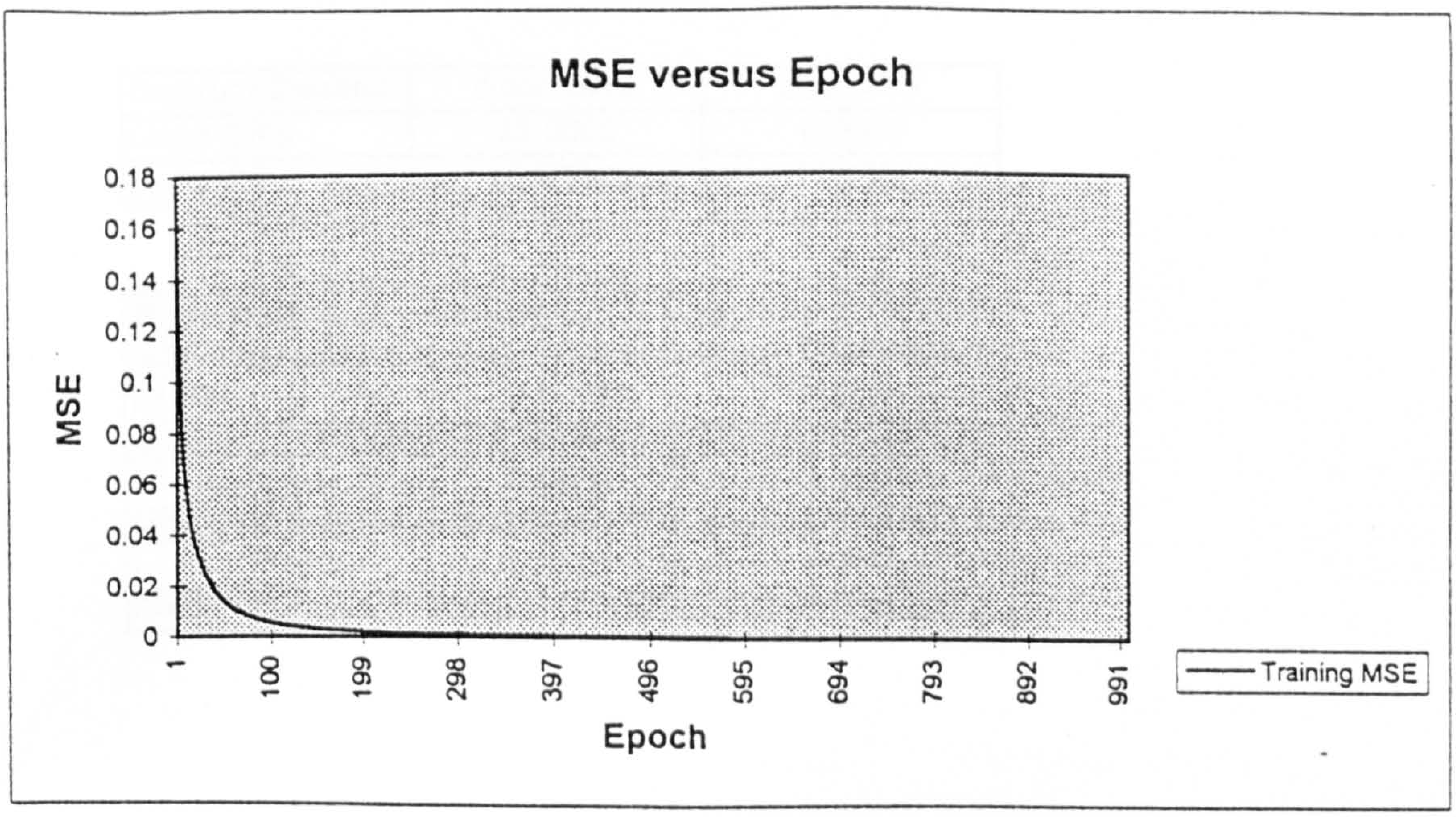
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.0004	0.0003
NMSE	0.0018	0.0014
MAE	0.0128	0.0116
Min Abs Error	0.0007	0.0003
Max Abs Error	0.0594	0.0492
r	0.9995	0.9996
Percent Correct	100.0000	100.0000

Test-P&R-1-TEST Report

Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	8.0000	2.0000
Bad DRS	1.0000	2.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.2189	0.2122
NMSE	1.0276	0.9963
MAE	0.2554	0.2536
Min Abs Error	0.0006	0.0003
Max Abs Error	0.9683	0.9767
r	0.4112	0.4199
Percent Correct	88.8889	50.0000



Best Network	Training
Epoch #	997.0000
Minimum MSE	0.0002
Final MSE	0.0002

Test-E&O&P-1-TRAIN Report

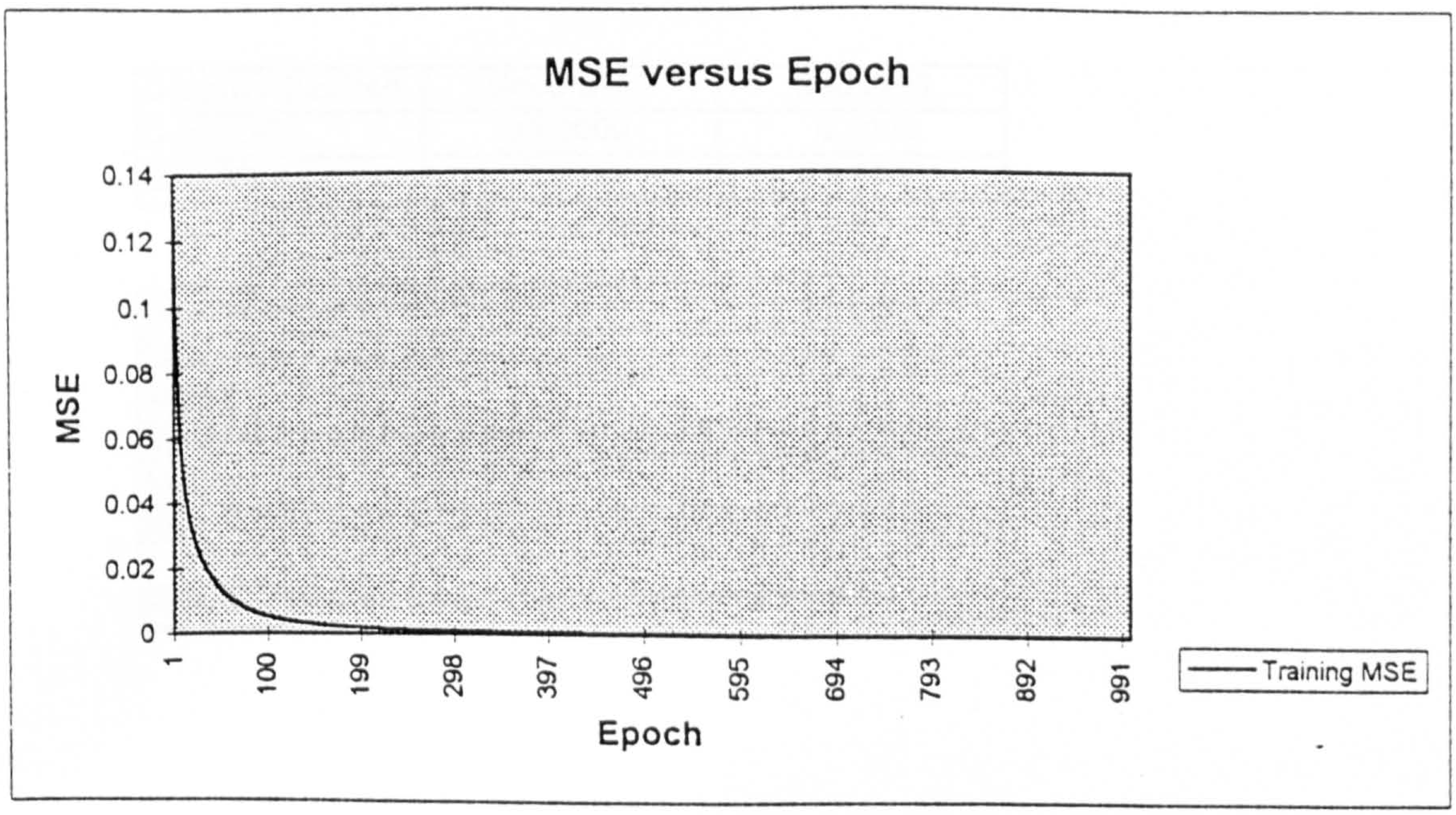
Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	Good DRS	Bad DRS
MSE	0.0005	0.0005
NMSE	0.0022	0.0021
MAE	0.0136	0.0134
Min Abs Error	0.0006	0.0005
Max Abs Error	0.0664	0.0690
r	0.9993	0.9993
Percent Correct	100.0000	100.0000

Test-E&O&P-1-TEST Report

Output / Desired	Good DRS	Bad DRS
Good DRS	8.0000	2.0000
Bad DRS	1.0000	2.0000

Performance	Good DRS	Bad DRS
MSE	0.1434	0.1205
NMSE	0.6734	0.5657
MAE	0.2209	0.2031
Min Abs Error	0.0007	0.0005
Max Abs Error	0.8430	0.8063
r	0.6078	0.6754
Percent Correct	88.8889	50.0000



Best Network	*Training*
Epoch #	997.0000
Minimum MSE	0.0002
Final MSE	0.0002

Test-E&O&R-1-TRAIN Report

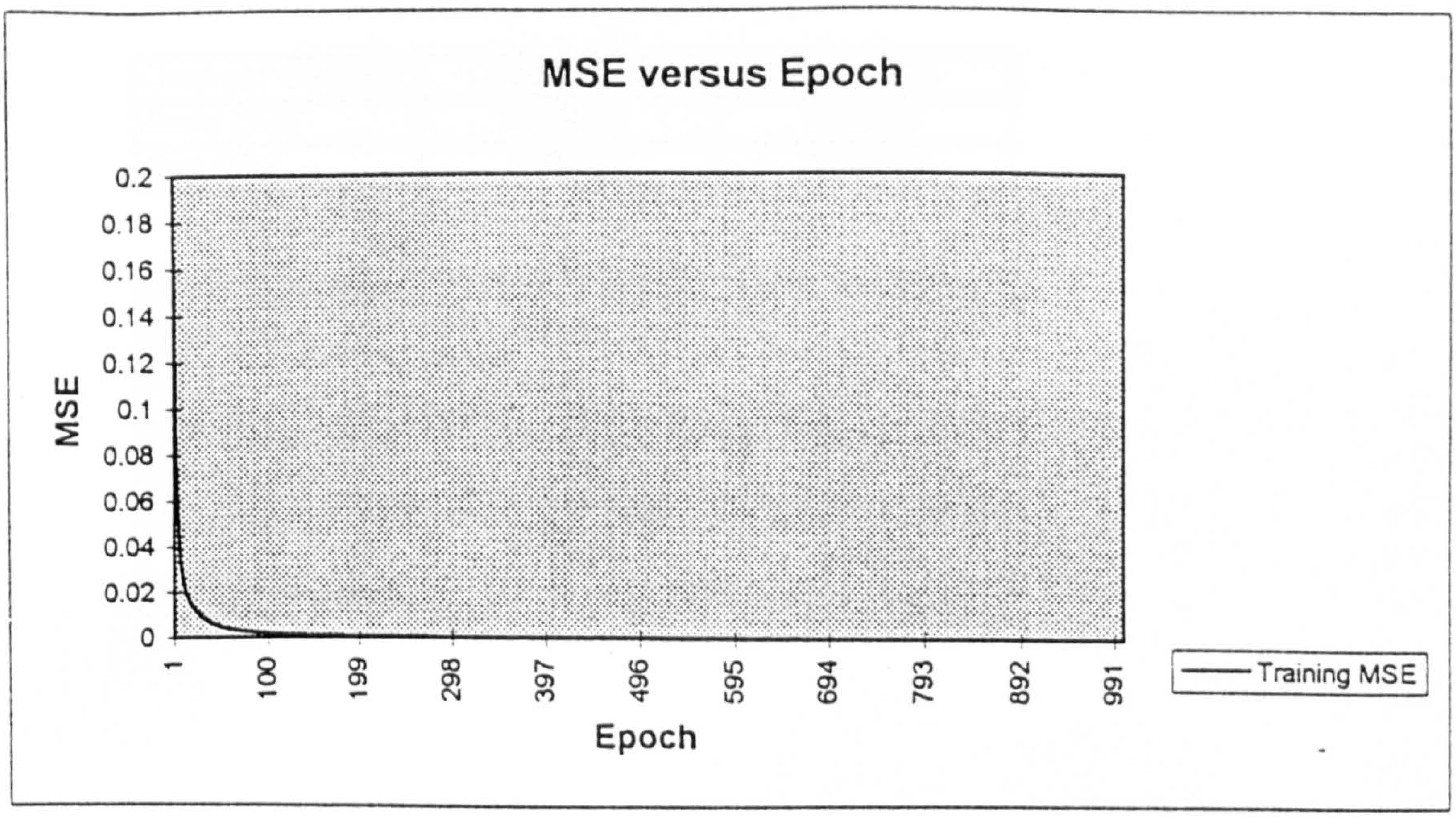
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.0004	0.0004
NMSE	0.0019	0.0019
MAE	0.0137	0.0134
Min Abs Error	0.0001	0.0001
Max Abs Error	0.0550	0.0525
r	0.9995	0.9995
Percent Correct	100.0000	100.0000

Test-E&O&R-1-TEST Report

Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	8.0000	3.0000
Bad DRS	1.0000	1.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.2850	0.2798
NMSE	1.3379	1.3134
MAE	0.3355	0.3332
Min Abs Error	0.0003	0.0002
Max Abs Error	0.9956	0.9938
r	0.1552	0.1703
Percent Correct	88.8889	25.0000



Best Network	*Training*
Epoch #	993.0000
Minimum MSE	0.0001
Final MSE	0.0001

Test-E&P&R-1-TRAIN Report

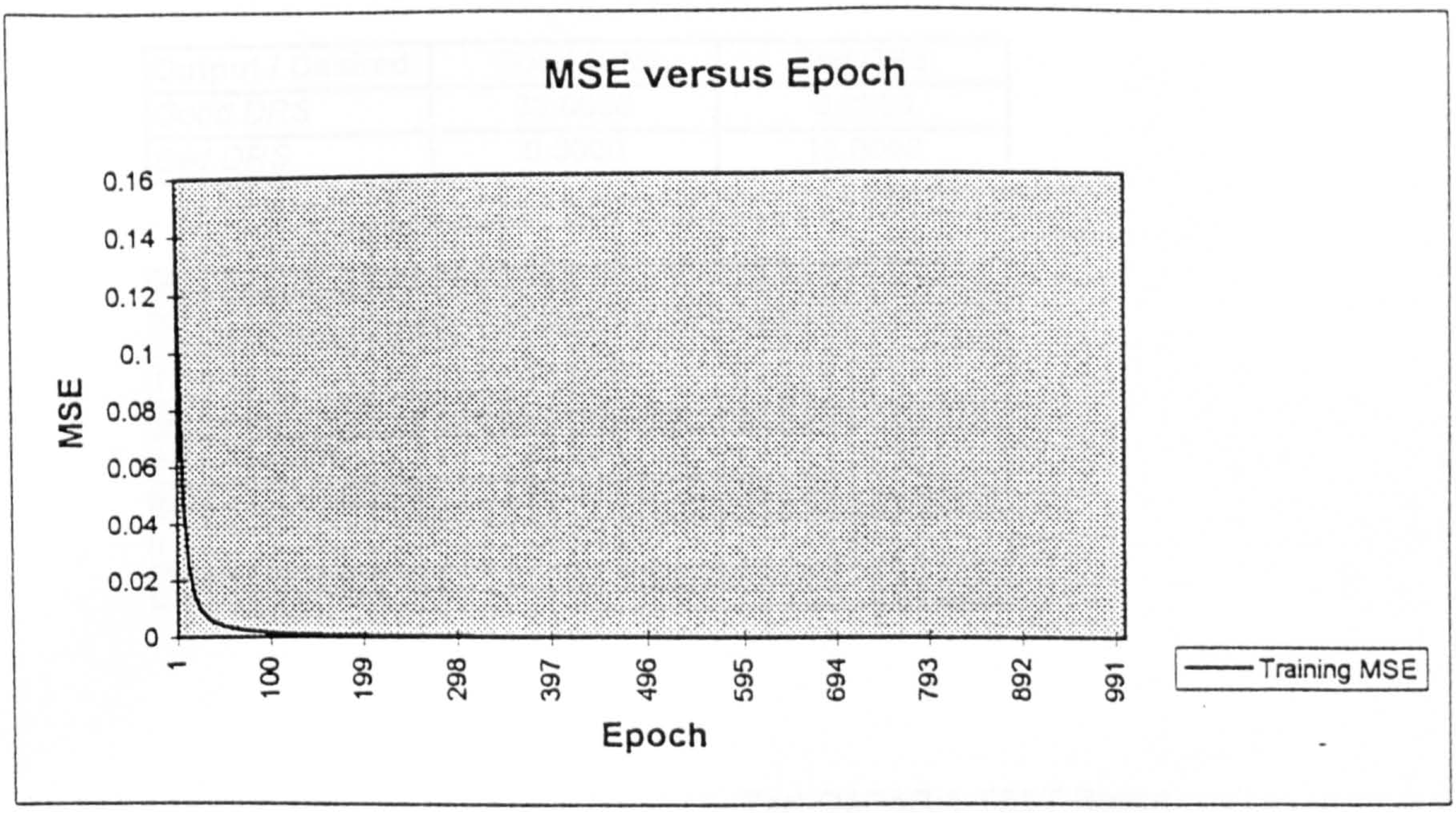
Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	Good DRS	Bad DRS
MSE	0.0002	0.0002
NMSE	0.0010	0.0010
MAE	0.0102	0.0102
Min Abs Error	0.0004	0.0005
Max Abs Error	0.0457	0.0462
r	0.9997	0.9997
Percent Correct	100.0000	100.0000

Test-E&P&R-1-TEST Report

Output / Desired	Good DRS	Bad DRS
Good DRS	7.0000	2.0000
Bad DRS	2.0000	2.0000

Performance	Good DRS	Bad DRS
MSE	0.2342	0.2316
NMSE	1.0994	1.0871
MAE	0.2957	0.2989
Min Abs Error	0.0008	0.0006
Max Abs Error	0.9665	0.9718
r	0.3543	0.3554
Percent Correct	77.7778	50.0000



Best Network	*Training*
Epoch #	993.0000
Minimum MSE	0.0001
Final MSE	0.0001

Test-O&P&R-1-TRAIN Report

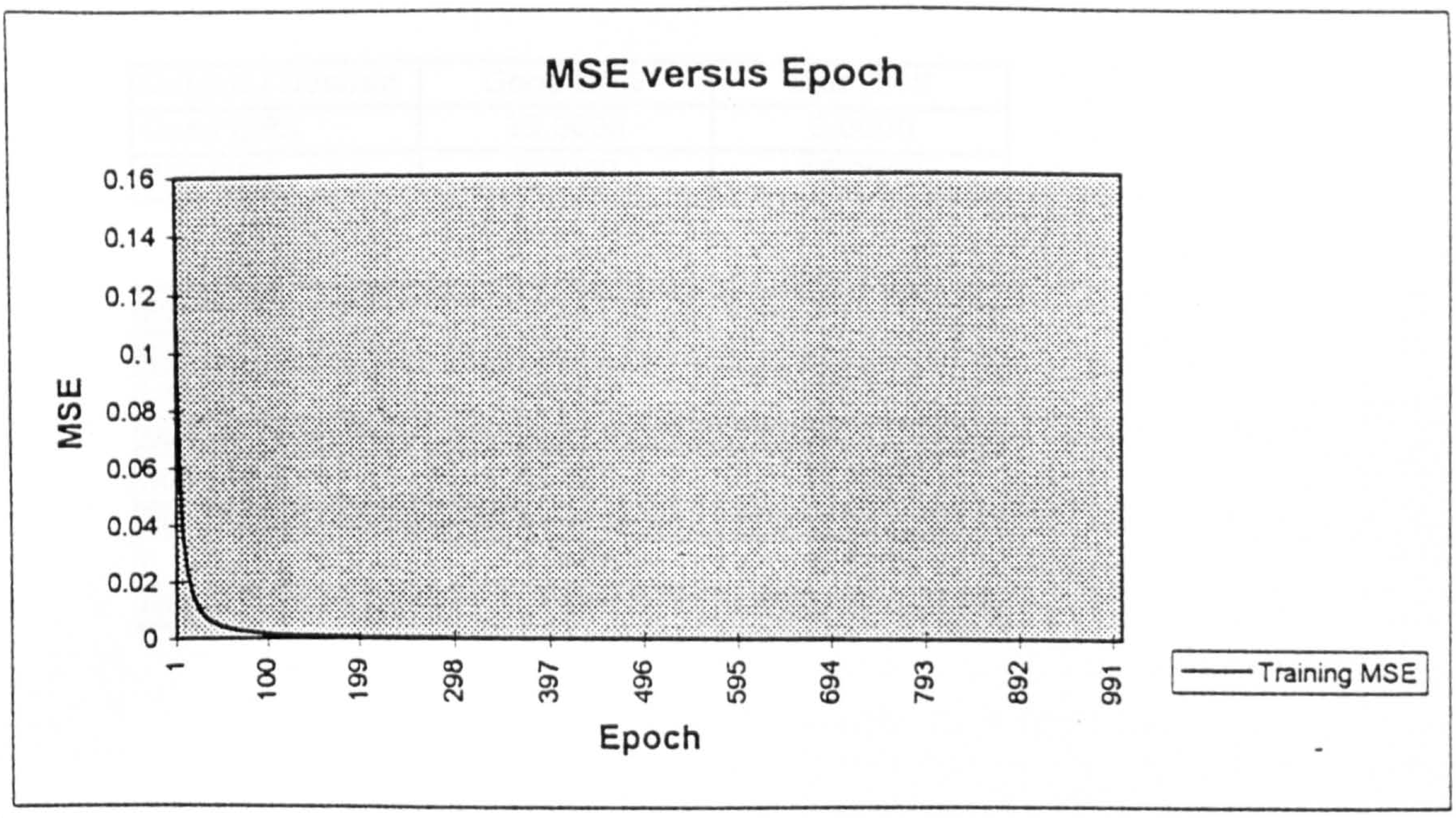
Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	Good DRS	Bad DRS
MSE	0.0002	0.0002
NMSE	0.0010	0.0010
MAE	0.0106	0.0104
Min Abs Error	0.0005	0.0006
Max Abs Error	0.0353	0.0369
r	0.9998	0.9998
Percent Correct	100.0000	100.0000

Test-O&P&R-1-TEST Report

Output / Desired	Good DRS	Bad DRS
Good DRS	8.0000	2.0000
Bad DRS	1.0000	2.0000

Performance	Good DRS	Bad DRS
MSE	0.1714	0.1688
NMSE	0.8045	0.7923
MAE	0.2290	0.2159
Min Abs Error	0.0007	0.0002
Max Abs Error	0.9450	0.9465
r	0.5317	0.5439
Percent Correct	88.8889	50.0000



Best Network	*Training*
Epoch #	992.0000
Minimum MSE	0.0001
Final MSE	0.0001

Test-E&O&P&R-1-TRAIN Report

Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

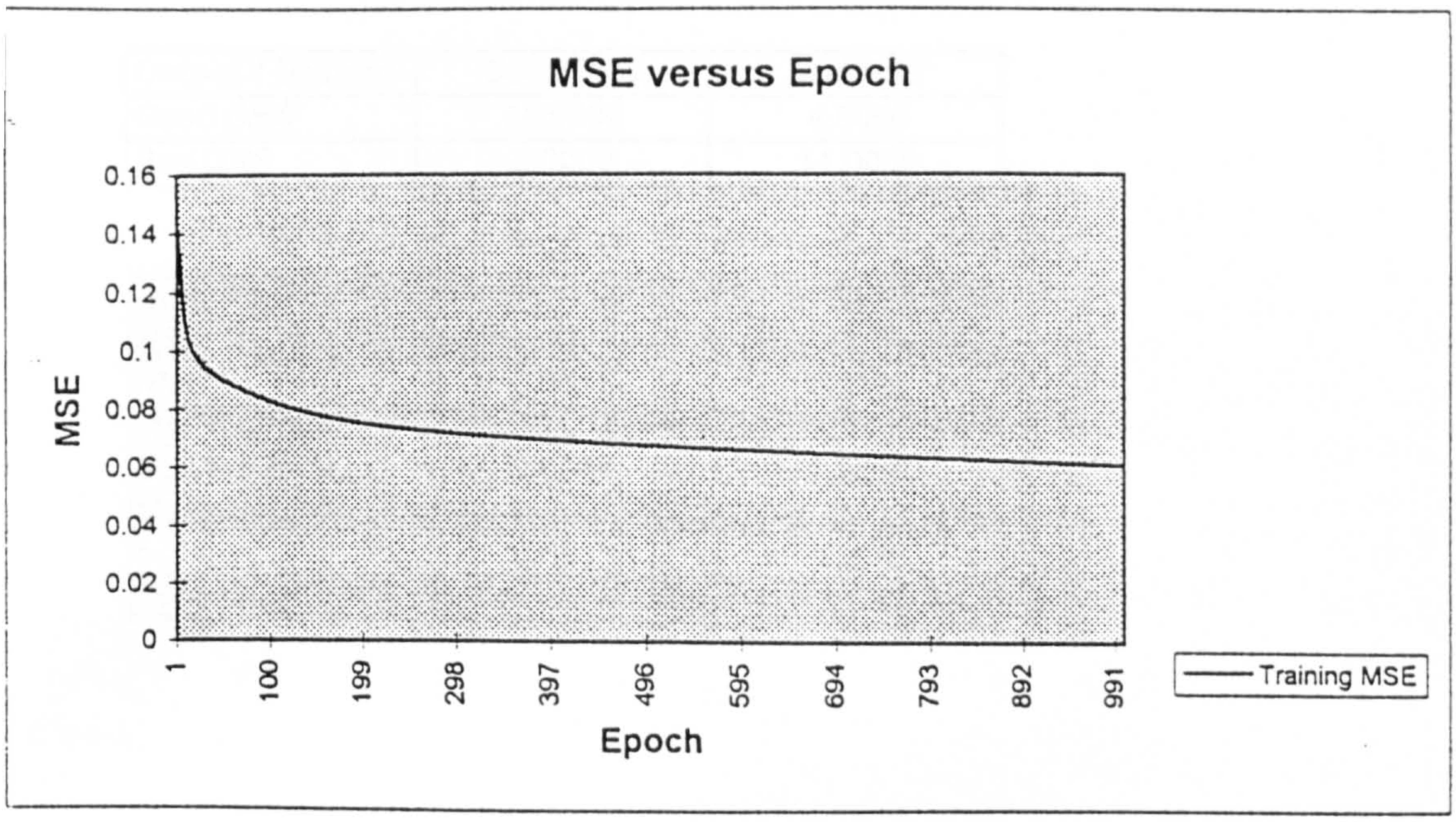
Performance	Good DRS	Bad DRS
MSE	0.0002	0.0002
NMSE	0.0008	0.0009
MAE	0.0099	0.0101
Min Abs Error	0.0005	0.0005
Max Abs Error	0.0321	0.0315
r	0.9998	0.9998
Percent Correct	100.0000	100.0000

Test-E&O&P&R-1-TEST Report

Output / Desired	Good DRS	Bad DRS
Good DRS	7.0000	3.0000
Bad DRS	2.0000	1.0000

Performance	Good DRS	Bad DRS
MSE	0.1775	0.2136
NMSE	0.8334	1.0026
MAE	0.2637	0.2886
Min Abs Error	0.0006	0.0008
Max Abs Error	0.9379	0.9390
r	0.4768	0.3578
Percent Correct	77.7778	25.0000

Appendix N
Training and Testing Results using Two Hidden Layers
(Combinations of Variables)



Best Network	Training
Epoch #	1000.0000
Minimum MSE	0.0609
Final MSE	0.0609

Test-ts-e-2-train Report

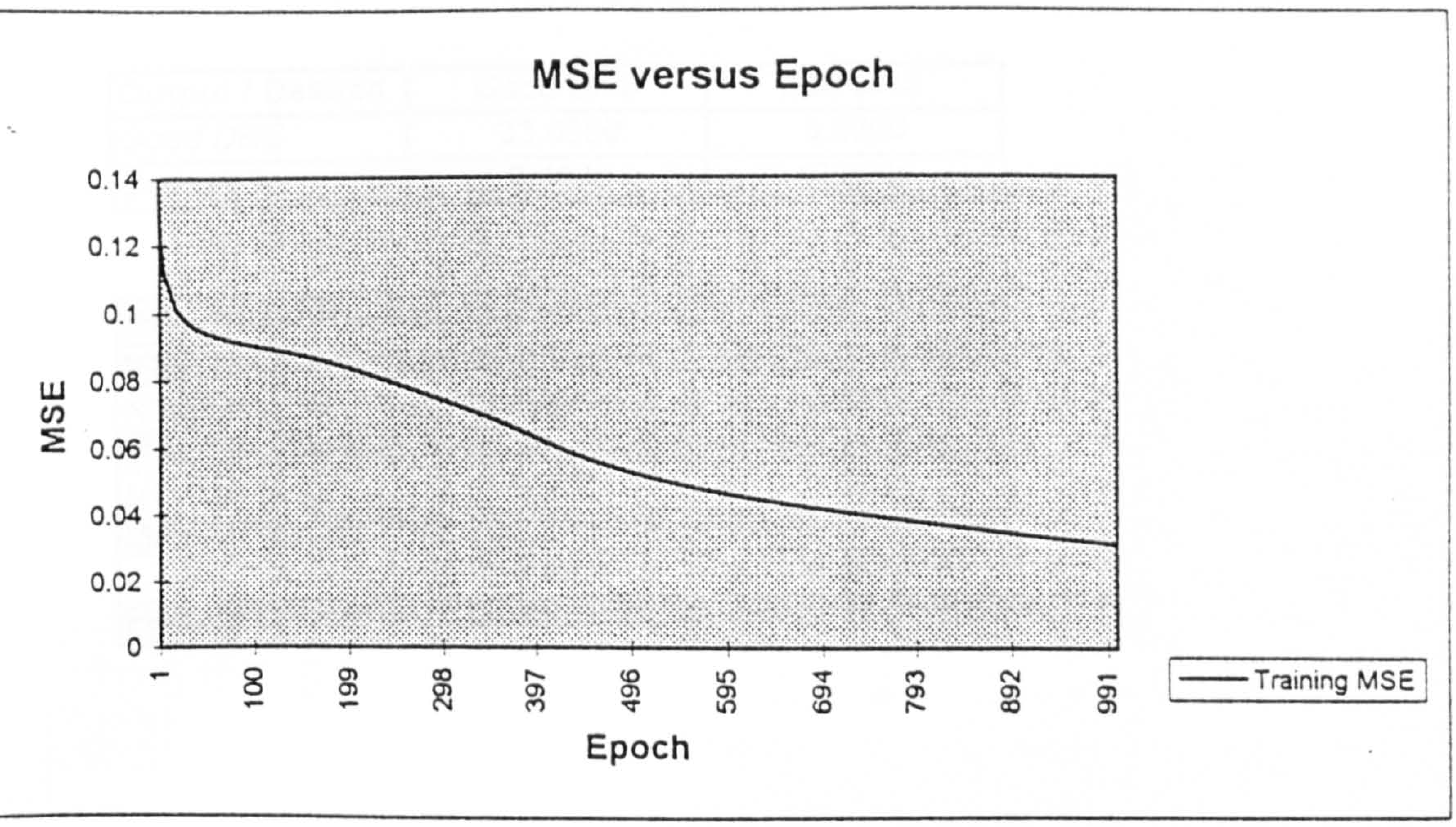
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	31.0000	4.0000
Bad DRS	2.0000	11.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.1234	0.1201
NMSE	0.5745	0.5592
MAE	0.2602	0.2470
Min Abs Error	0.0984	0.0656
Max Abs Error	0.8998	0.9283
r	0.6545	0.6646
Percent Correct	93.9394	73.3333

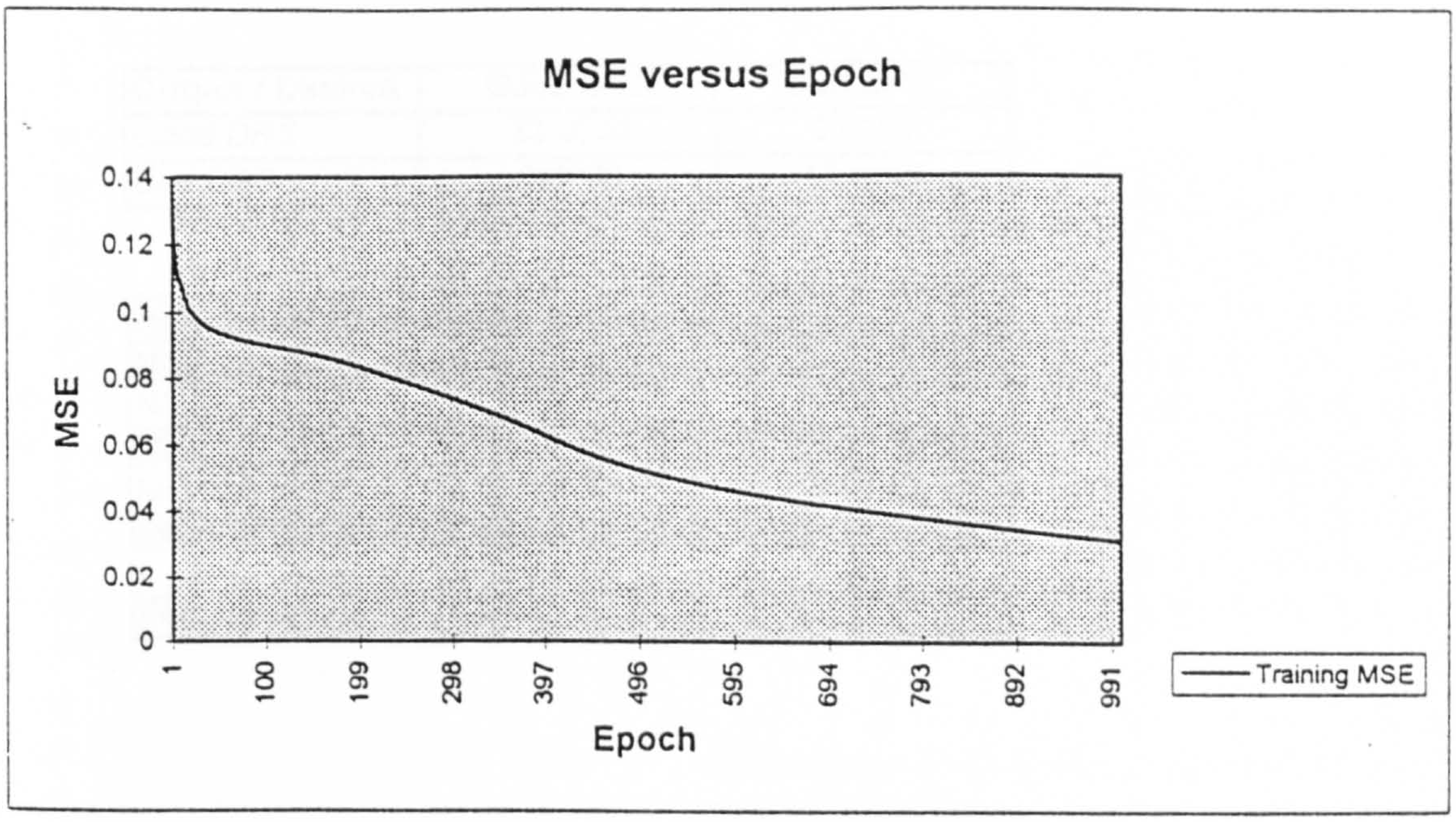
Test-ts-e-2-test Report

Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	6.0000	4.0000
Bad DRS	3.0000	0.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.4111	0.4259
NMSE	1.9297	1.9994
MAE	0.5527	0.5625
Min Abs Error	0.1012	0.1060
Max Abs Error	0.8993	0.9299
r	-0.5109	-0.4959
Percent Correct	66.6667	0.0000



Best Network	Training
Epoch #	1000.0000
Minimum MSE	0.0311
Final MSE	0.0311



Best Network	Training
Epoch #	1000.0000
Minimum MSE	0.0311
Final MSE	0.0311

Test-TS-O-2-TRAIN Report

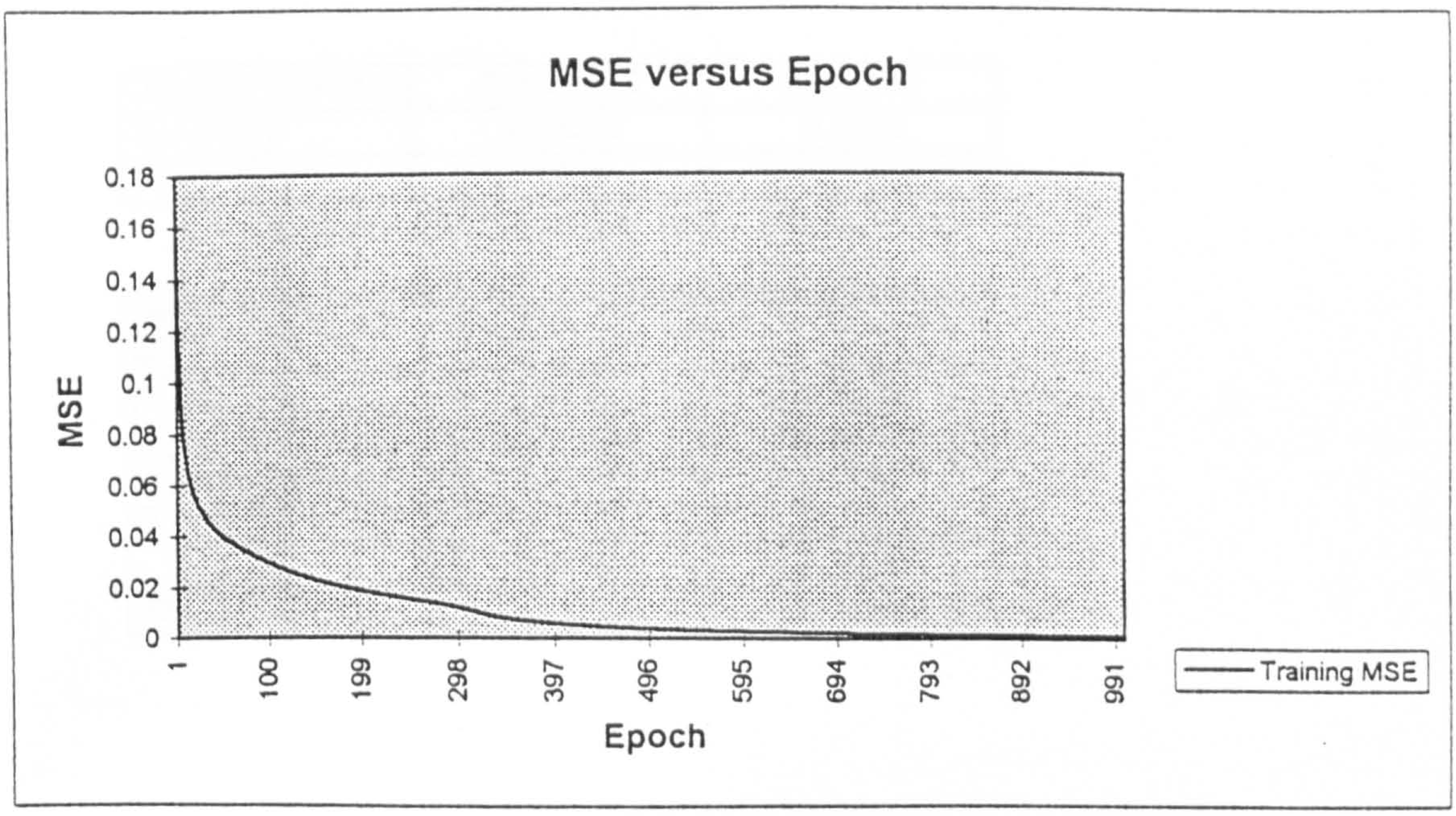
Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	3.0000
Bad DRS	0.0000	12.0000

Performance	Good DRS	Bad DRS
MSE	0.0627	0.0615
NMSE	0.2919	0.2862
MAE	0.1720	0.1666
Min Abs Error	0.0594	0.0531
Max Abs Error	0.9404	0.9400
r	0.8624	0.8616
Percent Correct	100.0000	80.0000

Test-TS-O-2-TEST Report

Output / Desired	Good DRS	Bad DRS
Good DRS	8.0000	4.0000
Bad DRS	1.0000	0.0000

Performance	Good DRS	Bad DRS
MSE	0.2762	0.2680
NMSE	1.2966	1.2583
MAE	0.3820	0.3746
Min Abs Error	0.0590	0.0553
Max Abs Error	0.9298	0.9242
r	-0.0080	0.0409
Percent Correct	88.8889	0.0000



Best Network	Training
Epoch #	1000.0000
Minimum MSE	0.0012
Final MSE	0.0012

Test-TS-P-1-TRAIN Report

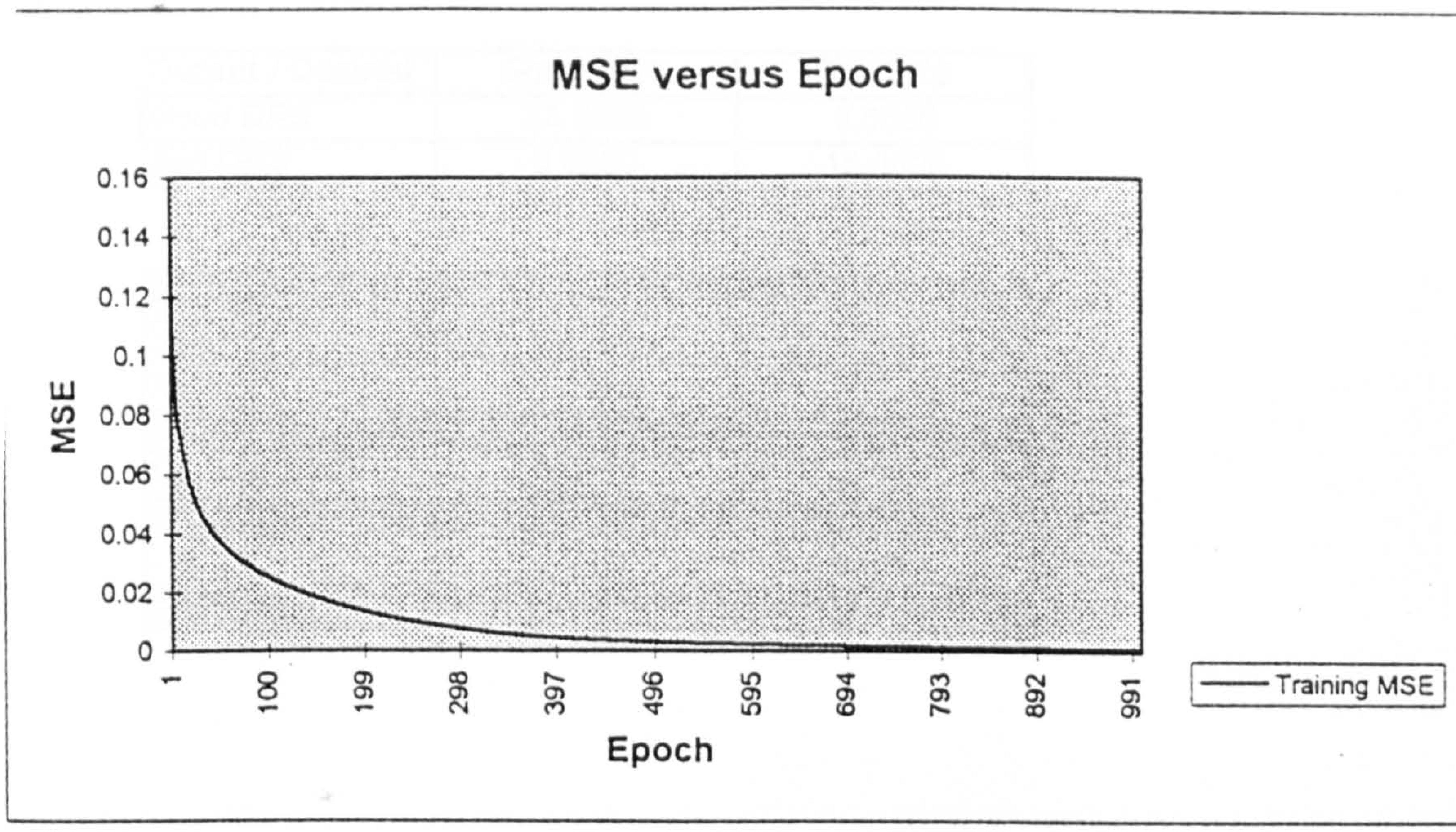
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.0026	0.0023
NMSE	0.0122	0.0107
MAE	0.0457	0.0433
Min Abs Error	0.0294	0.0227
Max Abs Error	0.1087	0.1122
r	0.9986	0.9988
Percent Correct	100.0000	100.0000

Test-TS-P-1-TEST Report

Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	7.0000	1.0000
Bad DRS	2.0000	3.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.0920	0.0931
NMSE	0.4319	0.4370
MAE	0.1985	0.1981
Min Abs Error	0.0295	0.0314
Max Abs Error	0.6464	0.7069
r	0.7577	0.7595
Percent Correct	77.7778	75.0000



Best Network	*Training*
Epoch #	1000.0000
Minimum MSE	0.0011
Final MSE	0.0011

Test-TS-R-2-TRAIN Report

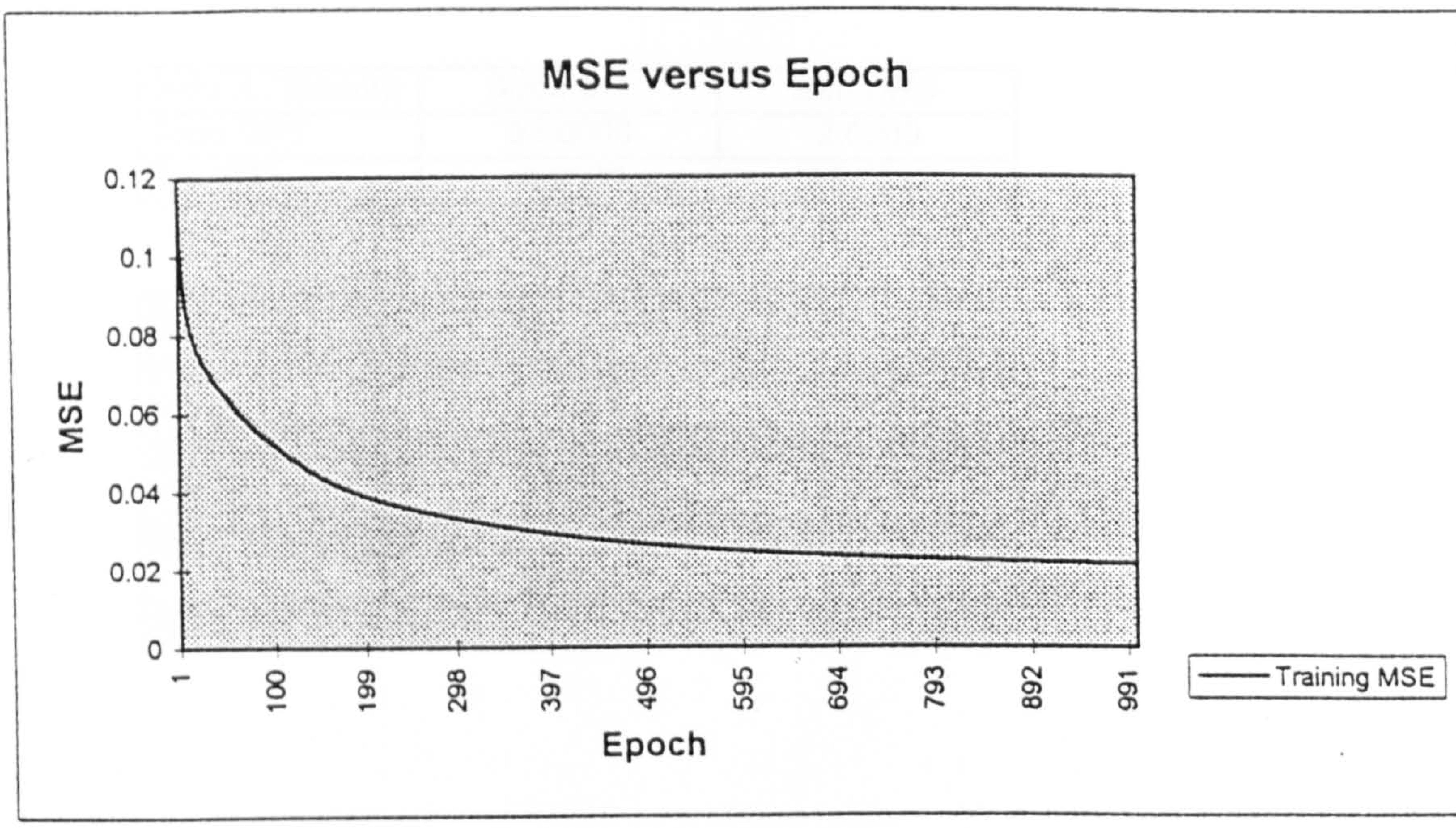
Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	Good DRS	Bad DRS
MSE	0.0021	0.0024
NMSE	0.0096	0.0110
MAE	0.0394	0.0409
Min Abs Error	0.0115	0.0178
Max Abs Error	0.1074	0.1201
r	0.9986	0.9981
Percent Correct	100.0000	100.0000

Test-TS-R-2-TEST Report

Output / Desired	Good DRS	Bad DRS
Good DRS	6.0000	3.0000
Bad DRS	3.0000	1.0000

Performance	Good DRS	Bad DRS
MSE	0.3913	0.3702
NMSE	1.8369	1.7377
MAE	0.4448	0.4324
Min Abs Error	0.0191	0.0257
Max Abs Error	0.9875	0.9813
r	-0.0385	-0.0128
Percent Correct	66.6667	25.0000



Best Network	Training
Epoch #	1000.0000
Minimum MSE	0.0214
Final MSE	0.0214

Test-E&O-2-TRAIN Report

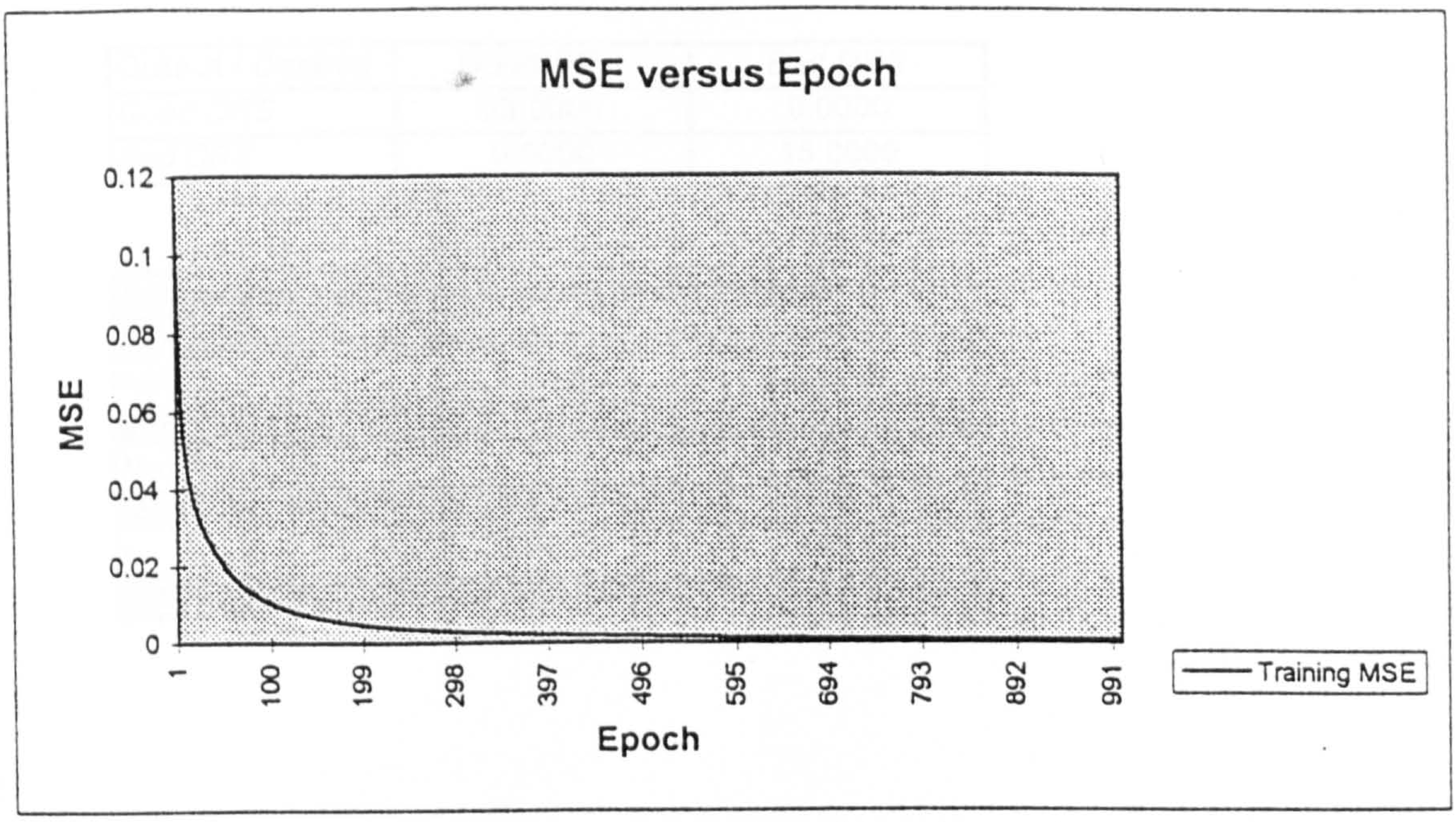
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	33.0000	2.0000
Bad DRS	0.0000	13.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.0423	0.0433
NMSE	0.1969	0.2015
MAE	0.0985	0.0986
Min Abs Error	0.0250	0.0339
Max Abs Error	0.9480	0.9633
r	0.8991	0.8968
Percent Correct	100.0000	86.6667

Test-E&O-2-TEST Report

Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	7.0000	4.0000
Bad DRS	2.0000	0.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.3899	0.3987
NMSE	1.8303	1.8717
MAE	0.4539	0.4559
Min Abs Error	0.0323	0.0368
Max Abs Error	0.9537	0.9625
r	-0.2946	-0.3044
Percent Correct	77.7778	0.0000



Best Network	*Training*
Epoch #	999.0000
Minimum MSE	0.0007
Final MSE	0.0007

Test-E&O-2-TRAIN Report

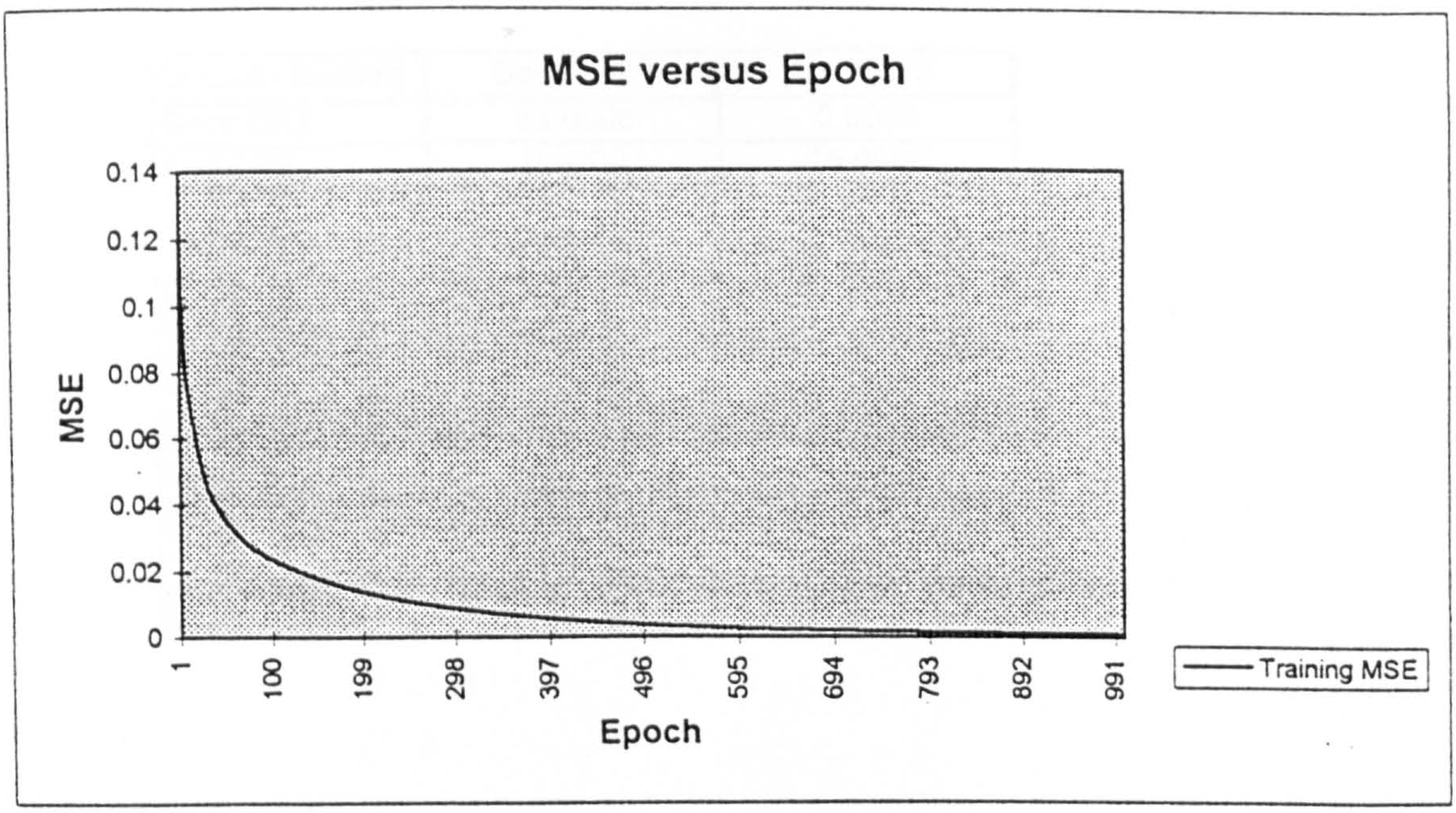
Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	Good DRS	Bad DRS
MSE	0.0017	0.0012
NMSE	0.0080	0.0057
MAE	0.0365	0.0299
Min Abs Error	0.0184	0.0132
Max Abs Error	0.1069	0.0935
r	0.9991	0.9992
Percent Correct	100.0000	100.0000

Test-E&O-2-TEST Report

Output / Desired	Good DRS	Bad DRS
Good DRS	7.0000	1.0000
Bad DRS	2.0000	3.0000

Performance	Good DRS	Bad DRS
MSE	0.1339	0.1323
NMSE	0.6284	0.6209
MAE	0.2150	0.2156
Min Abs Error	0.0198	0.0168
Max Abs Error	0.9268	0.9147
r	0.6311	0.6333
Percent Correct	77.7778	75.0000



Best Network	Training
Epoch #	1000.0000
Minimum MSE	0.0011
Final MSE	0.0011

Test-E&R-2-TRAIN Report

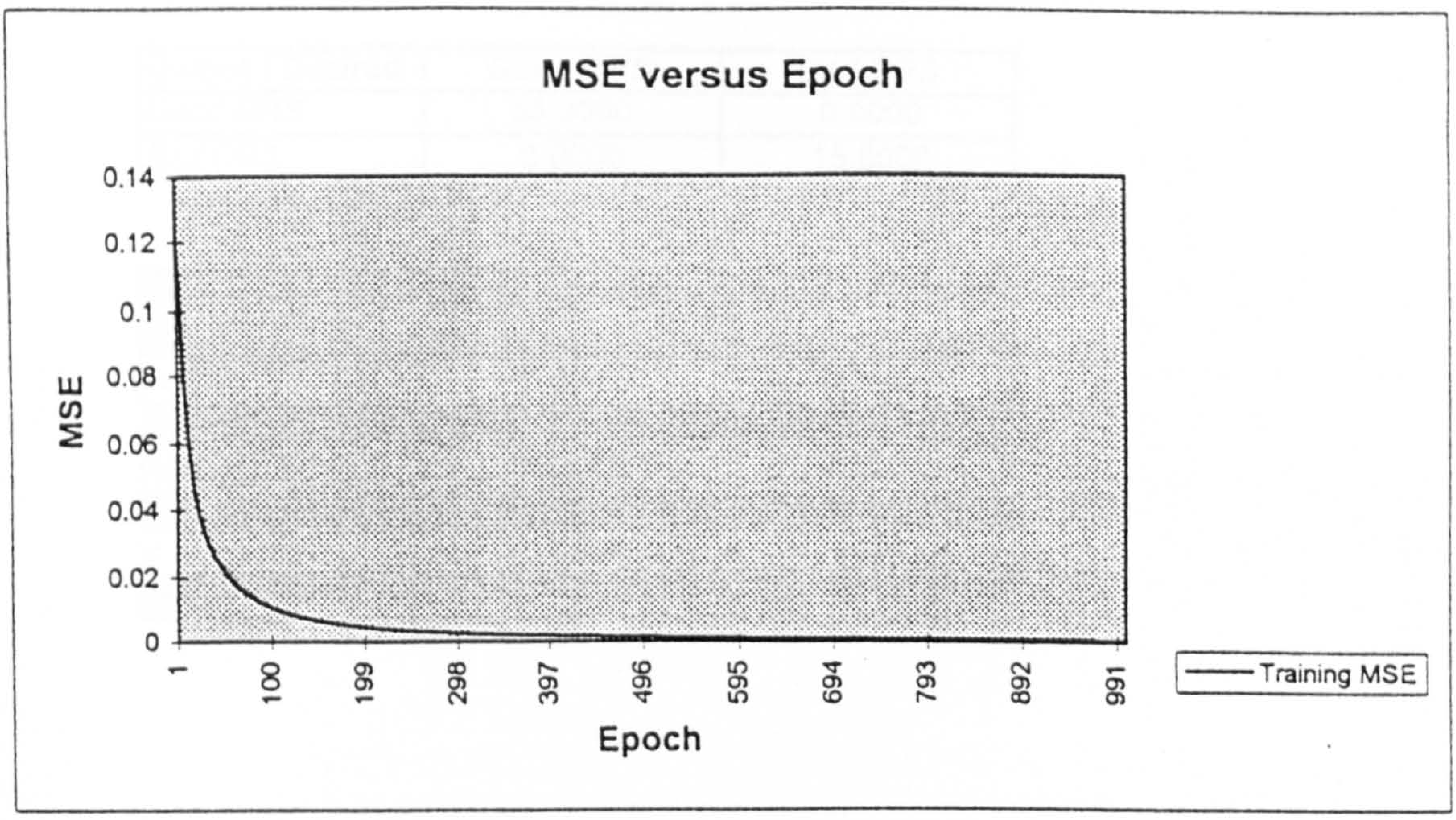
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.0021	0.0022
NMSE	0.0098	0.0104
MAE	0.0351	0.0396
Min Abs Error	0.0108	0.0207
Max Abs Error	0.1606	0.1524
r	0.9977	0.9982
Percent Correct	100.0000	100.0000

Test-E&R-2-TEST Report

Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	7.0000	2.0000
Bad DRS	2.0000	2.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.2984	0.2927
NMSE	1.4010	1.3742
MAE	0.3545	0.3584
Min Abs Error	0.0178	0.0242
Max Abs Error	0.9808	0.9760
r	0.1830	0.1782
Percent Correct	77.7778	50.0000



Best Network	Training
Epoch #	999.0000
Minimum MSE	0.0006
Final MSE	0.0006

Test-O&P-2-TRAIN Report

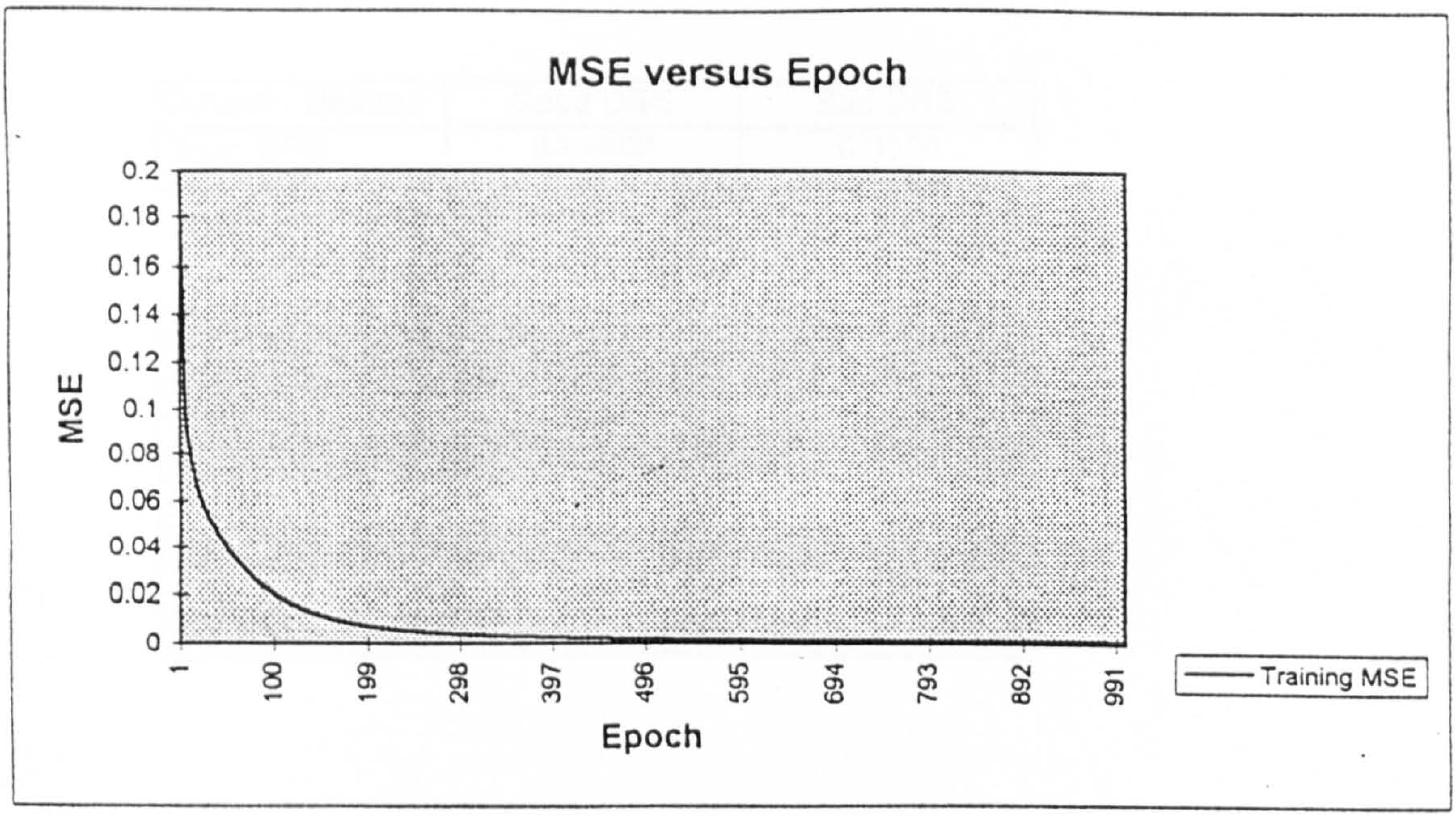
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.0011	0.0013
NMSE	0.0049	0.0061
MAE	0.0287	0.0346
Min Abs Error	0.0149	0.0211
Max Abs Error	0.0704	0.0615
r	0.9994	0.9997
Percent Correct	100.0000	100.0000

Test-O&P-2-TEST Report

Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	9.0000	3.0000
Bad DRS	0.0000	1.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.1806	0.1840
NMSE	0.8478	0.8638
MAE	0.2221	0.2305
Min Abs Error	0.0146	0.0239
Max Abs Error	0.9554	0.9557
r	0.5625	0.5403
Percent Correct	100.0000	25.0000



Best Network	Training
Epoch #	1000.0000
Minimum MSE	0.0009
Final MSE	0.0009

Test-O&R-2-TRAIN Report

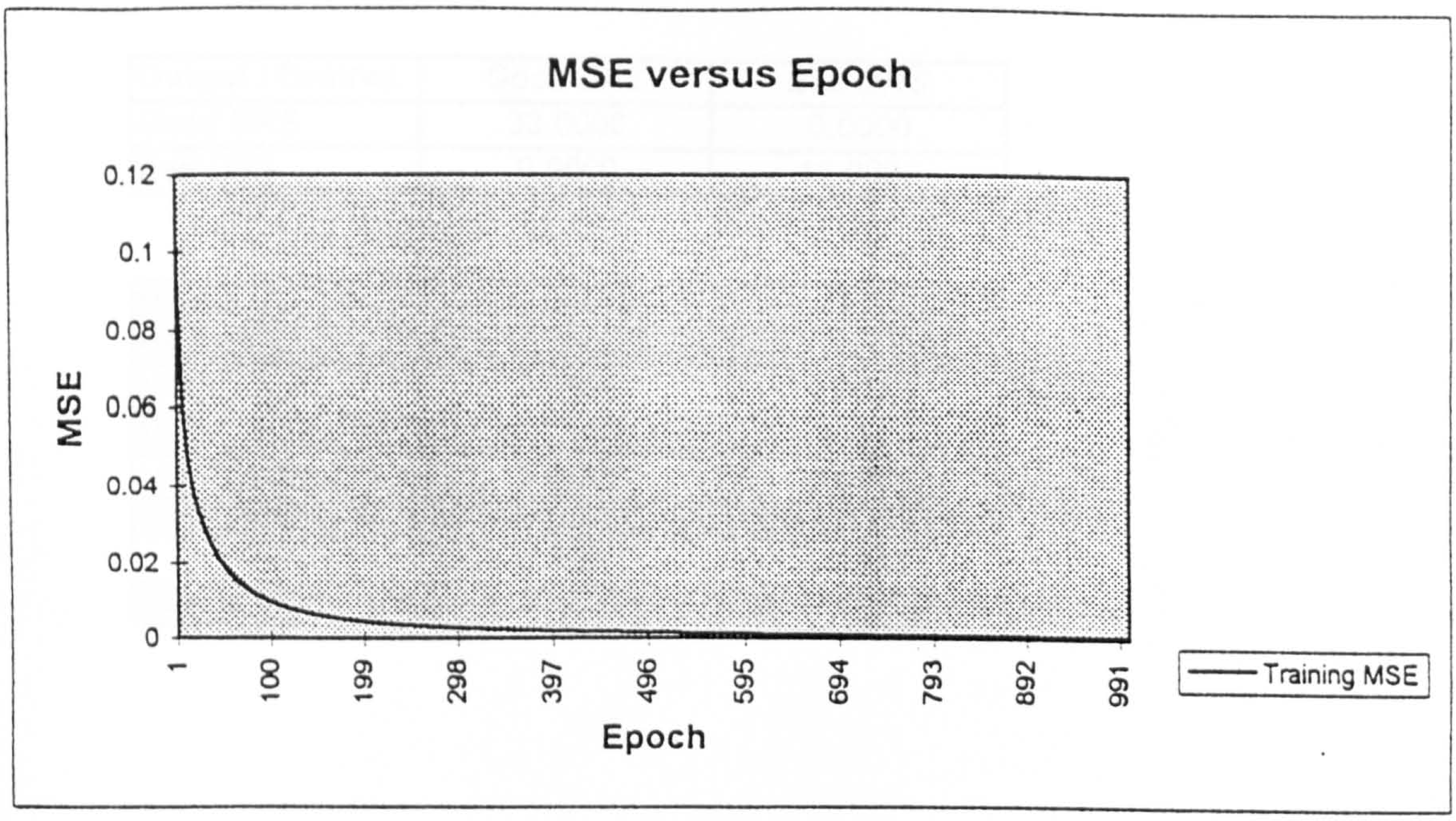
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.0018	0.0016
NMSE	0.0084	0.0076
MAE	0.0398	0.0372
Min Abs Error	0.0223	0.0182
Max Abs Error	0.0857	0.0896
r	0.9995	0.9995
Percent Correct	100.0000	100.0000

Test-O&R-2-TEST Report

Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	6.0000	1.0000
Bad DRS	3.0000	3.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.2282	0.2418
NMSE	1.0711	1.1352
MAE	0.3152	0.3289
Min Abs Error	0.0195	0.0162
Max Abs Error	0.9699	0.9705
r	0.4079	0.3504
Percent Correct	66.6667	75.0000



Best Network	Training
Epoch #	999.0000
Minimum MSE	0.0007
Final MSE	0.0007

Test-P&R-2-TRAIN Report

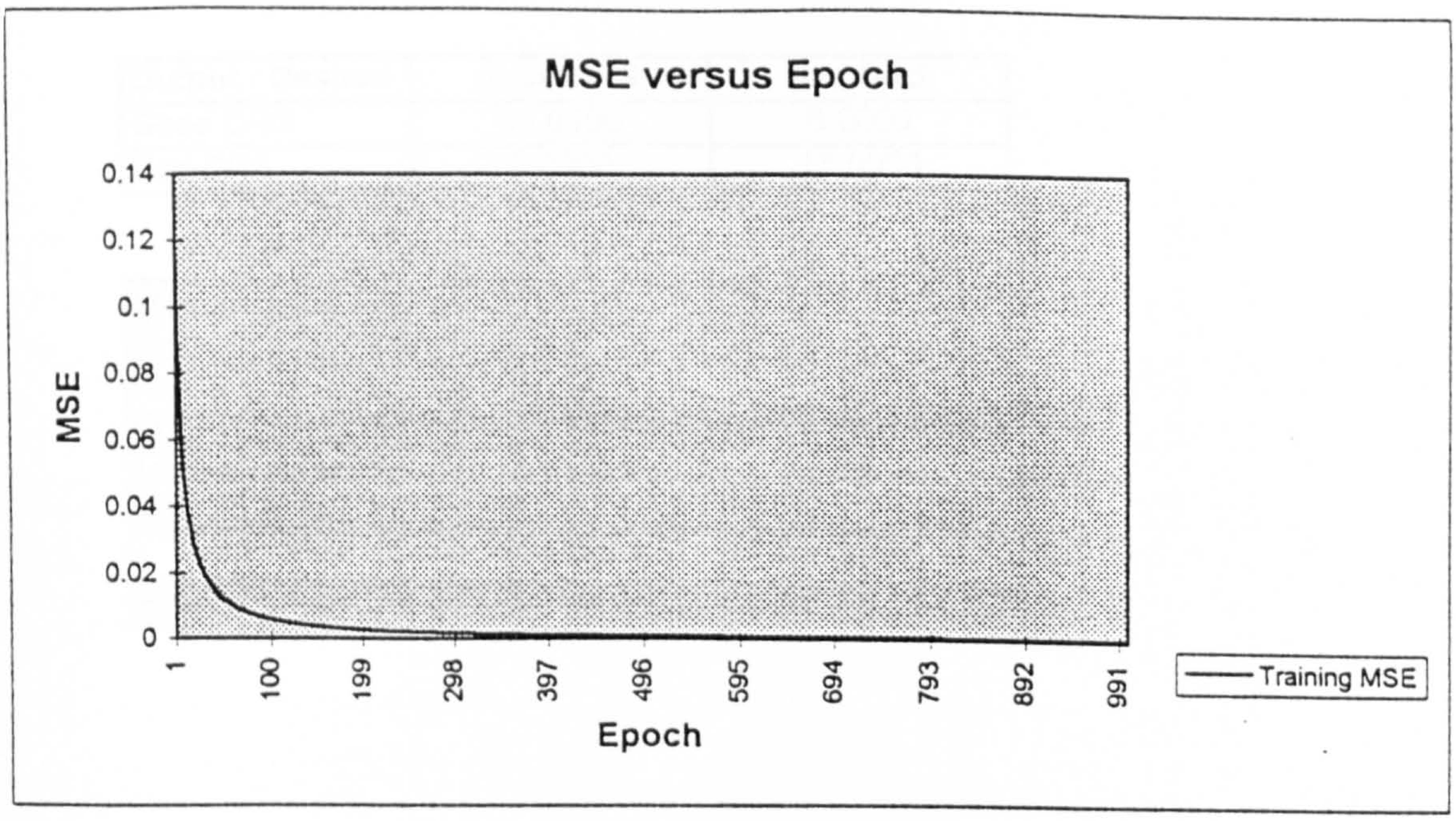
Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	Good DRS	Bad DRS
MSE	0.0014	0.0012
NMSE	0.0065	0.0057
MAE	0.0355	0.0327
Min Abs Error	0.0235	0.0200
Max Abs Error	0.0871	0.0981
r	0.9997	0.9996
Percent Correct	100.0000	100.0000

Test-P&R-2-TEST Report

Output / Desired	Good DRS	Bad DRS
Good DRS	8.0000	2.0000
Bad DRS	1.0000	2.0000

Performance	Good DRS	Bad DRS
MSE	0.2107	0.2236
NMSE	0.9892	1.0496
MAE	0.2715	0.2765
Min Abs Error	0.0240	0.0200
Max Abs Error	0.9531	0.9694
r	0.4033	0.3819
Percent Correct	88.8889	50.0000



Best Network	Training
Epoch #	998.0000
Minimum MSE	0.0005
Final MSE	0.0005

Test-E&O&P-2-TRAIN Report

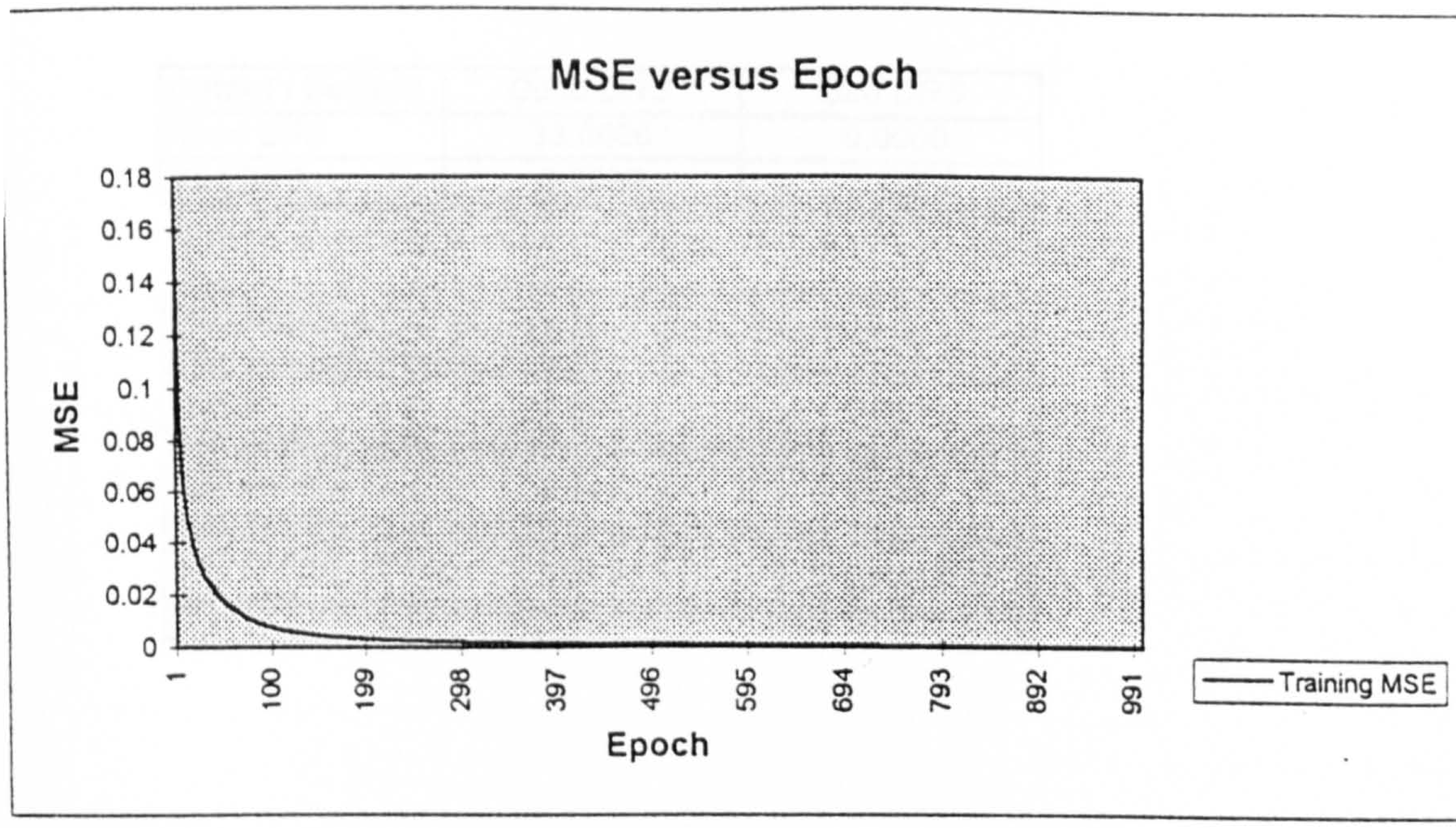
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.0010	0.0010
NMSE	0.0047	0.0046
MAE	0.0295	0.0290
Min Abs Error	0.0148	0.0176
Max Abs Error	0.0588	0.0715
r	0.9998	0.9997
Percent Correct	100.0000	100.0000

Test-E&O&P-2-TEST Report

Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	8.0000	1.0000
Bad DRS	1.0000	3.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.1097	0.1384
NMSE	0.5148	0.6496
MAE	0.1899	0.2137
Min Abs Error	0.0161	0.0196
Max Abs Error	0.7754	0.9098
r	0.7014	0.6153
Percent Correct	88.8889	75.0000



Best Network	Training
Epoch #	999.0000
Minimum MSE	0.0006
Final MSE	0.0006

Test-E&O&R-2-TRAIN Report

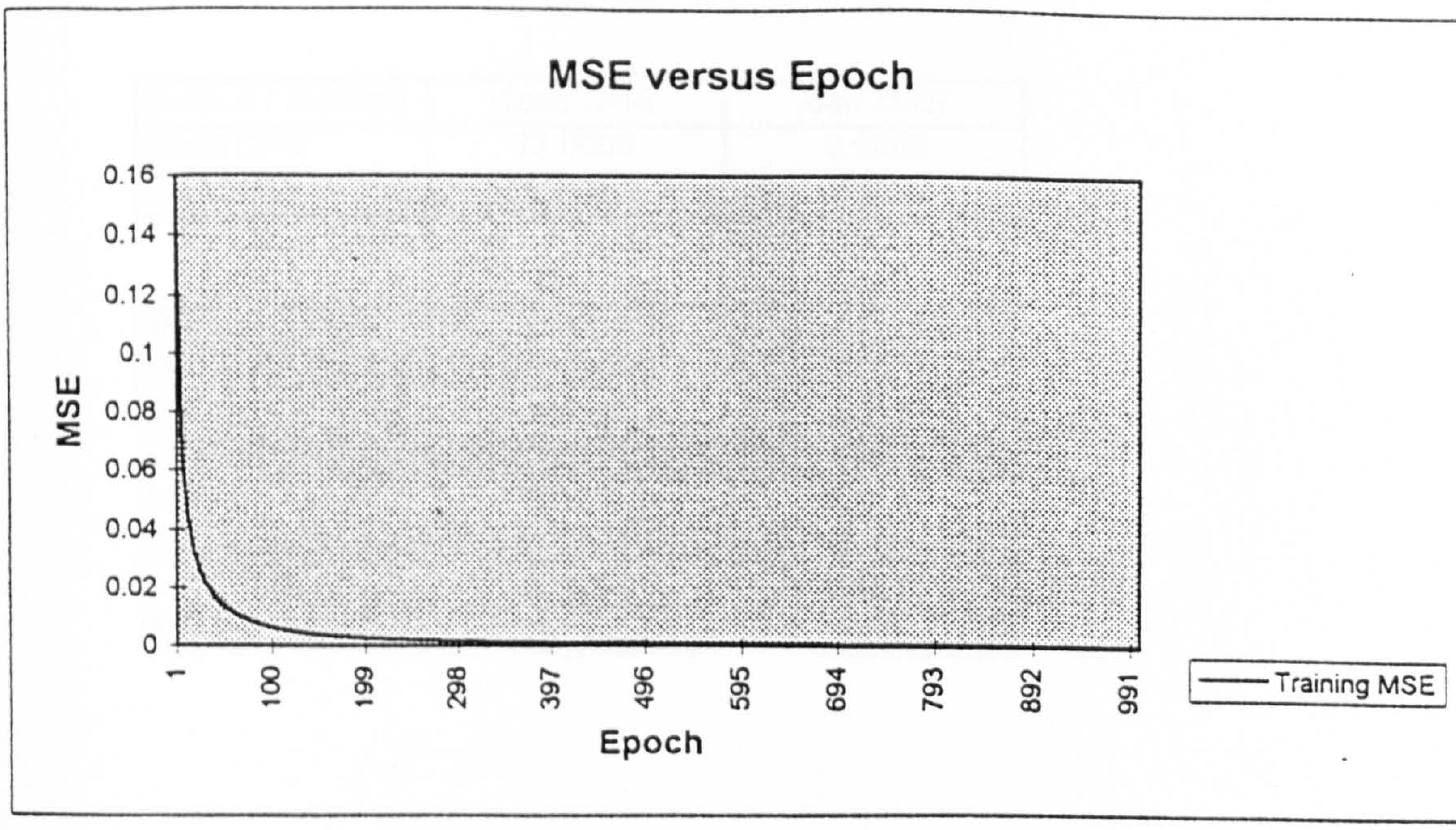
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.0013	0.0010
NMSE	0.0059	0.0046
MAE	0.0324	0.0292
Min Abs Error	0.0157	0.0157
Max Abs Error	0.0893	0.0694
r	0.9996	0.9997
Percent Correct	100.0000	100.0000

Test-E&O&R-2-TEST Report

Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	8.0000	3.0000
Bad DRS	1.0000	1.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.2703	0.2545
NMSE	1.2687	1.1950
MAE	0.3339	0.3158
Min Abs Error	0.0169	0.0157
Max Abs Error	0.9739	0.9740
r	0.1822	0.2367
Percent Correct	88.8889	25.0000



Best Network	Training
Epoch #	998.0000
Minimum MSE	0.0005
Final MSE	0.0005

Test-E&P&R-2-TRAIN Report

Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

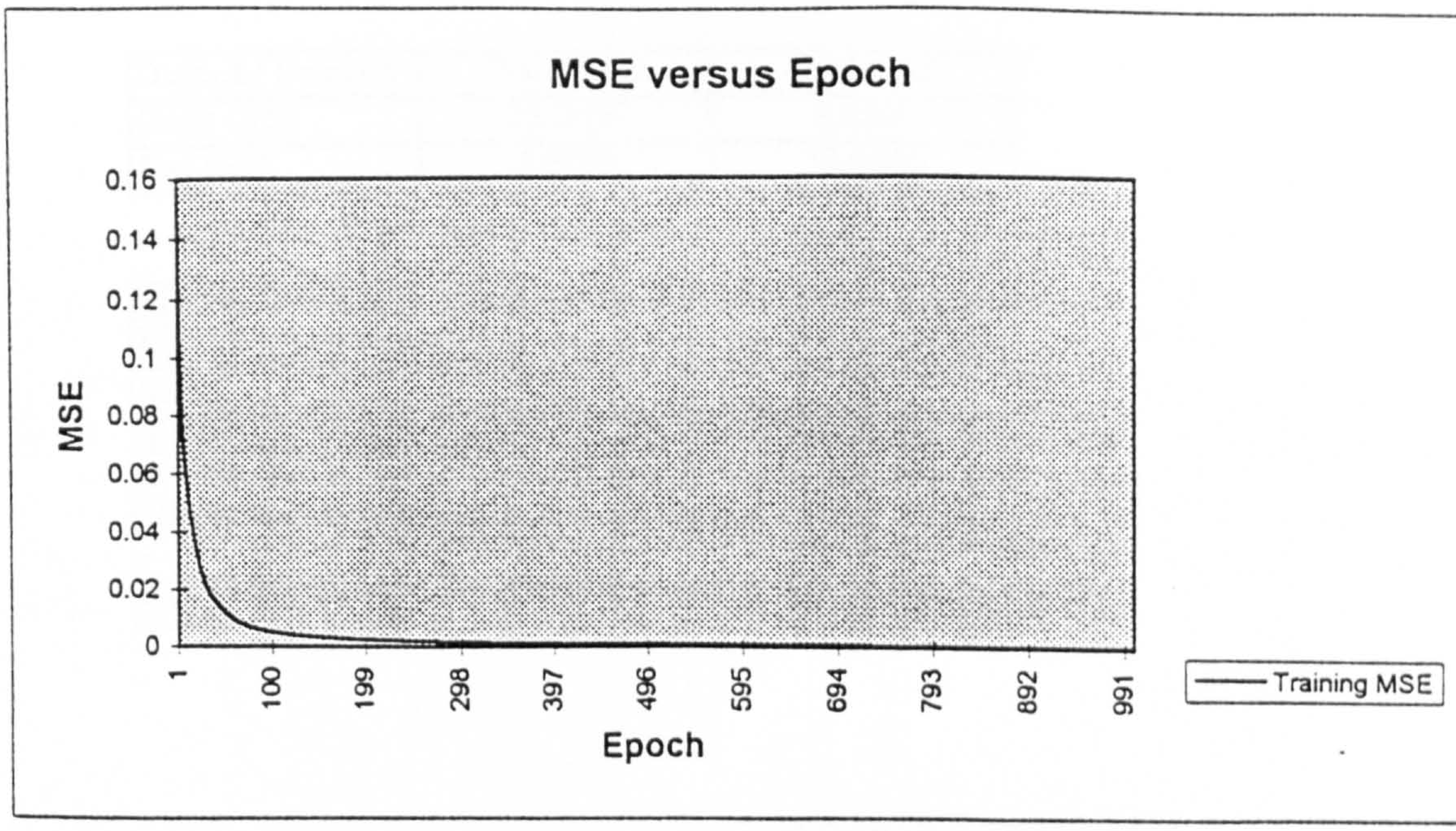
Performance	Good DRS	Bad DRS
MSE	0.0011	0.0008
NMSE	0.0051	0.0038
MAE	0.0322	0.0271
Min Abs Error	0.0242	0.0190
Max Abs Error	0.0519	0.0620
r	0.9999	0.9998
Percent Correct	100.0000	100.0000

Test-E&P&R-2-TEST Report

Output / Desired	Good DRS	Bad DRS
Good DRS	7.0000	2.0000
Bad DRS	2.0000	2.0000

Performance	Good DRS	Bad DRS
MSE	0.2527	0.2359
NMSE	1.1864	1.1073
MAE	0.3239	0.2997
Min Abs Error	0.0292	0.0203
Max Abs Error	0.9614	0.9579
r	0.3041	0.3492
Percent Correct	77.7778	50.0000

)



Best Network	***Training***
Epoch #	999.0000
Minimum MSE	0.0005
Final MSE	0.0005

Test-O&P&R-2-TRAIN Report

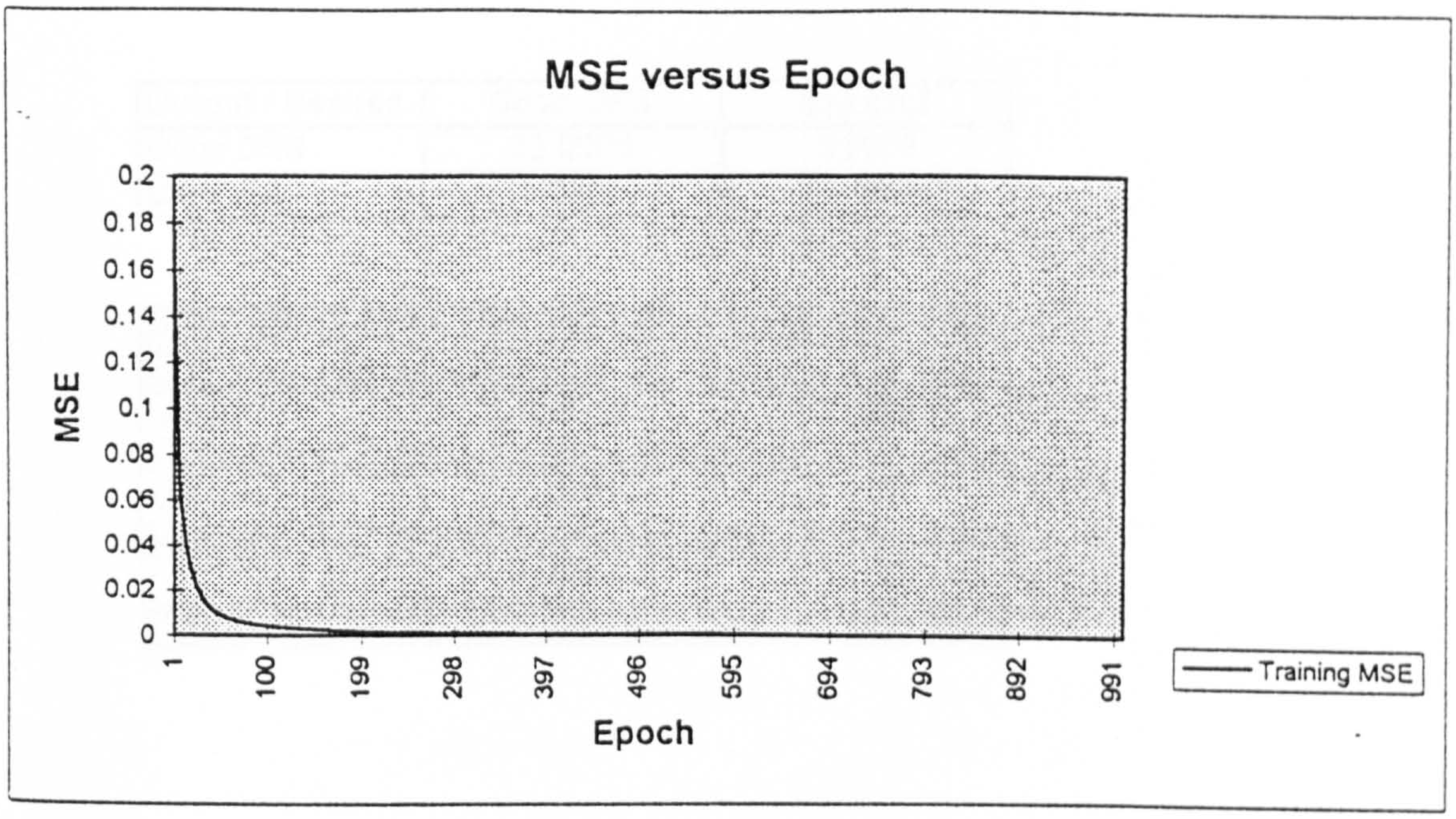
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.0010	0.0010
NMSE	0.0046	0.0049
MAE	0.0301	0.0309
Min Abs Error	0.0198	0.0198
Max Abs Error	0.0510	0.0527
r	0.9999	0.9999
Percent Correct	100.0000	100.0000

Test-O&P&R-2-TEST Report

Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	8.0000	2.0000
Bad DRS	1.0000	2.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.1923	0.1869
NMSE	0.9029	0.8772
MAE	0.2375	0.2393
Min Abs Error	0.0203	0.0222
Max Abs Error	0.9454	0.8969
r	0.4742	0.4847
Percent Correct	88.8889	50.0000



Best Network	Training
Epoch #	997.0000
Minimum MSE	0.0003
Final MSE	0.0003

Test-E&O&P&R-2-TRAIN Report

Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	Good DRS	Bad DRS
MSE	0.0007	0.0006
NMSE	0.0032	0.0026
MAE	0.0251	0.0227
Min Abs Error	0.0157	0.0137
Max Abs Error	0.0447	0.0417
r	0.9999	0.9999
Percent Correct	100.0000	100.0000

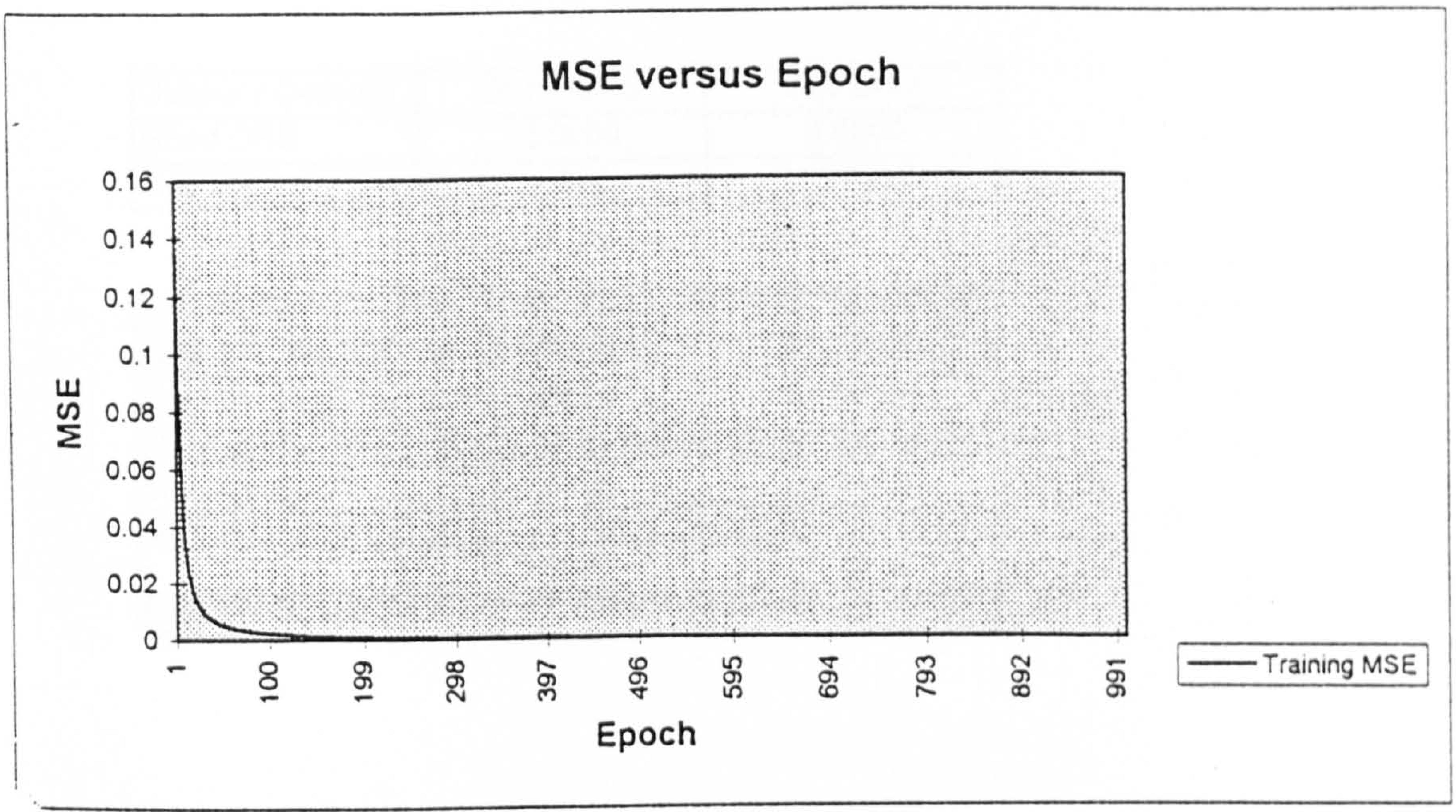
Test-E&O&P&R-2-TEST Report

Output / Desired	Good DRS	Bad DRS
Good DRS	8.0000	2.0000
Bad DRS	1.0000	2.0000

Performance	Good DRS	Bad DRS
MSE	0.2069	0.1972
NMSE	0.9713	0.9257
MAE	0.2808	0.2717
Min Abs Error	0.0180	0.0156
Max Abs Error	0.9621	0.9825
r	0.3870	0.4185
Percent Correct	88.8889	50.0000

Appendix O

Training and Testing Results using the 14 Selected Variables used in the MDA Model Development



Best Network	Training
Epoch #	995.0000
Minimum MSE	0.0001
Final MSE	0.0001

Test-mda14a22pe-1-tr Report

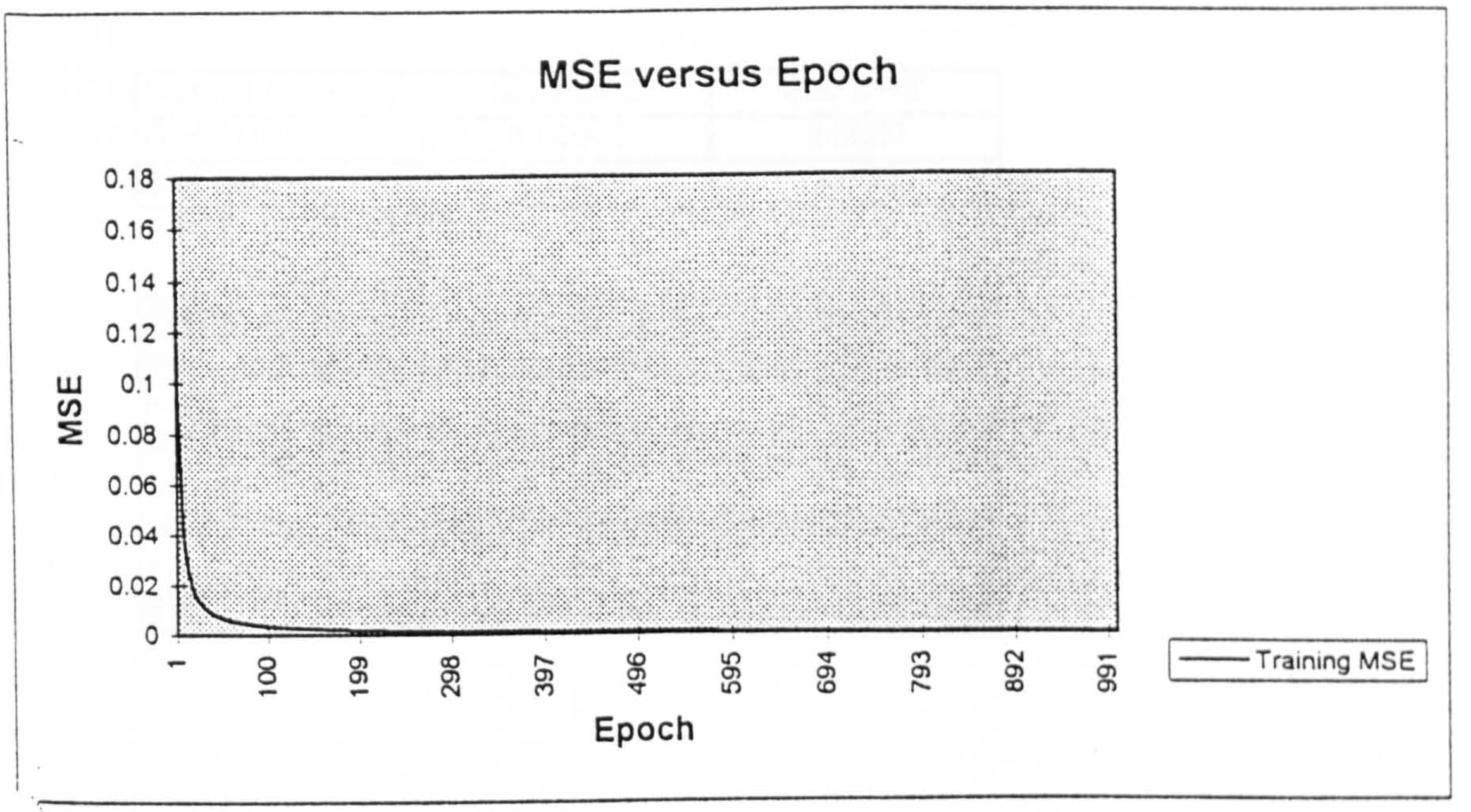
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.0003	0.0003
NMSE	0.0013	0.0015
MAE	0.0099	0.0106
Min Abs Error	0.0006	0.0010
Max Abs Error	0.0564	0.0607
r	0.9996	0.9995
Percent Correct	100.0000	100.0000

Test-mda14a22pe-1-te Report

Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	7.0000	0.0000
Bad DRS	2.0000	4.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.1115	0.1118
NMSE	0.5236	0.5251
MAE	0.1722	0.1717
Min Abs Error	0.0014	0.0013
Max Abs Error	0.9576	0.9538
r	0.7331	0.7332
Percent Correct	77.7778	100.0000



Best Network	*Training*
Epoch #	998.0000
Minimum MSE	0.0005
Final MSE	0.0005

Test-mda14a-2-tr Report

Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

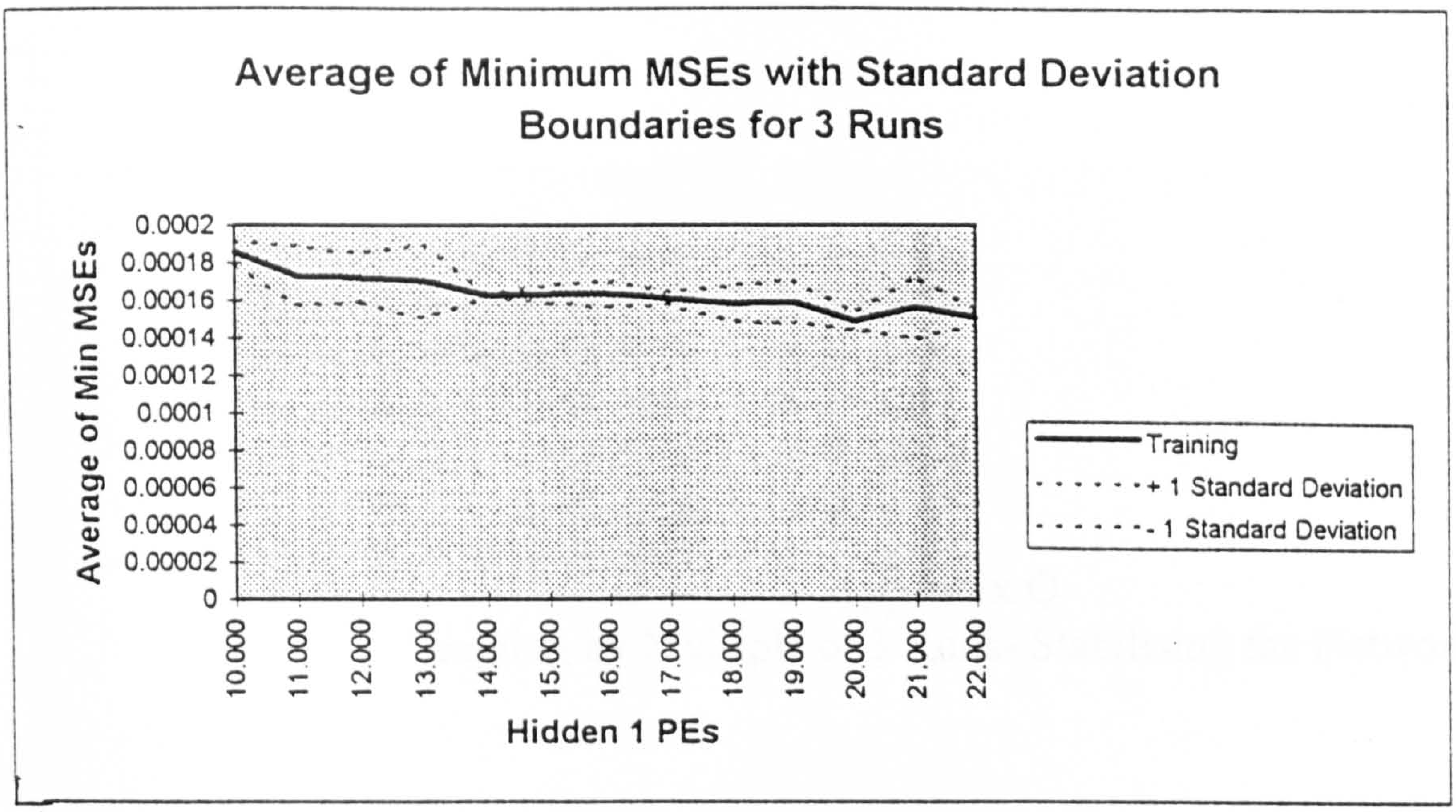
Performance	Good DRS	Bad DRS
MSE	0.0011	0.0009
NMSE	0.0049	0.0041
MAE	0.0316	0.0273
Min Abs Error	0.0209	0.0162
Max Abs Error	0.0641	0.0623
r	0.9998	0.9999
Percent Correct	100.0000	100.0000

Test-mda14a-2-te Report

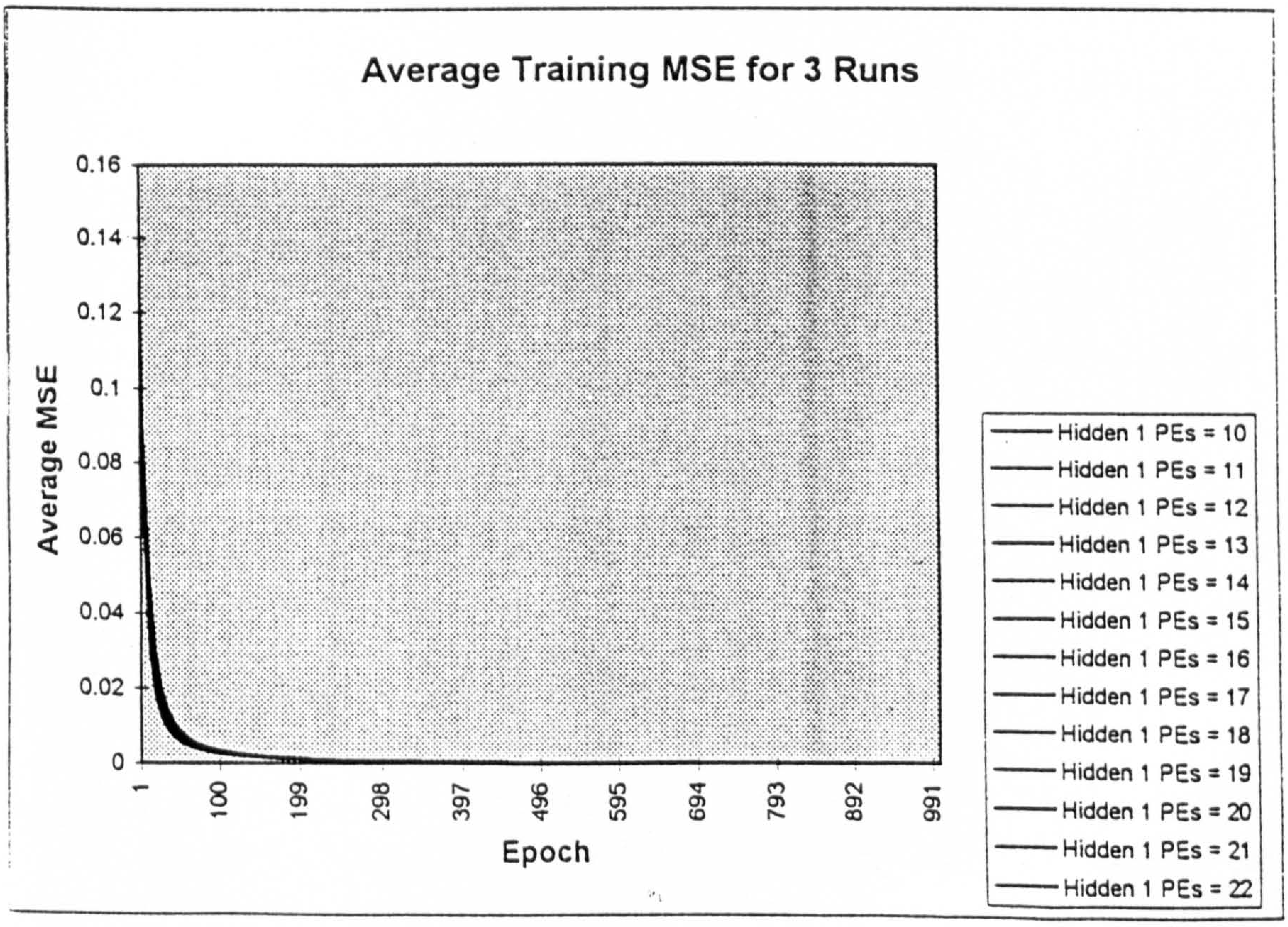
Output / Desired	Good DRS	Bad DRS
Good DRS	7.0000	0.0000
Bad DRS	2.0000	4.0000

Performance	Good DRS	Bad DRS
MSE	0.1302	0.1210
NMSE	0.6111	0.5679
MAE	0.2114	0.2024
Min Abs Error	0.0219	0.0178
Max Abs Error	0.9604	0.9527
r	0.6729	0.6891
Percent Correct	77.7778	100.0000

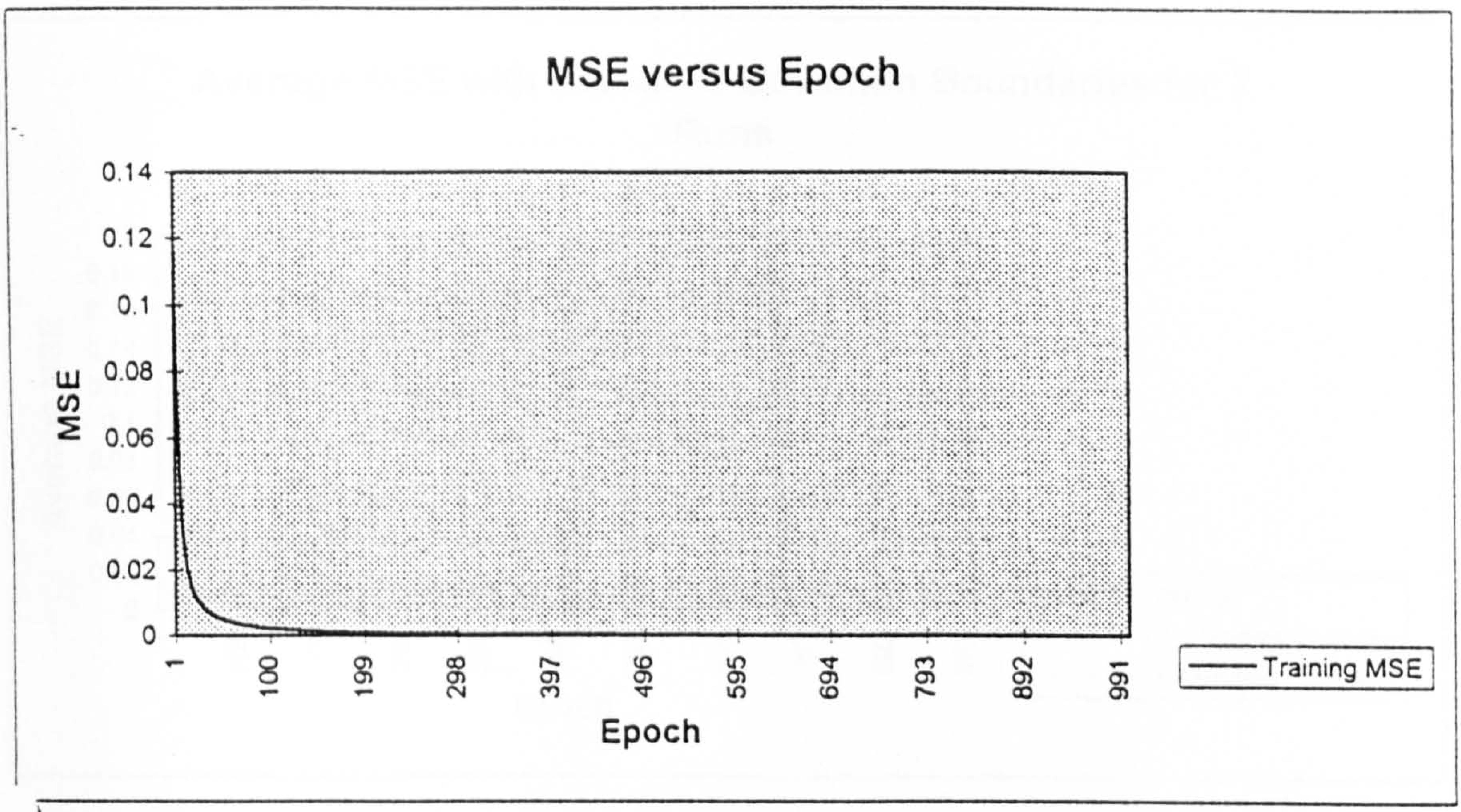
Appendix P
Training by Batch- Optimising the Number of Processing Elements



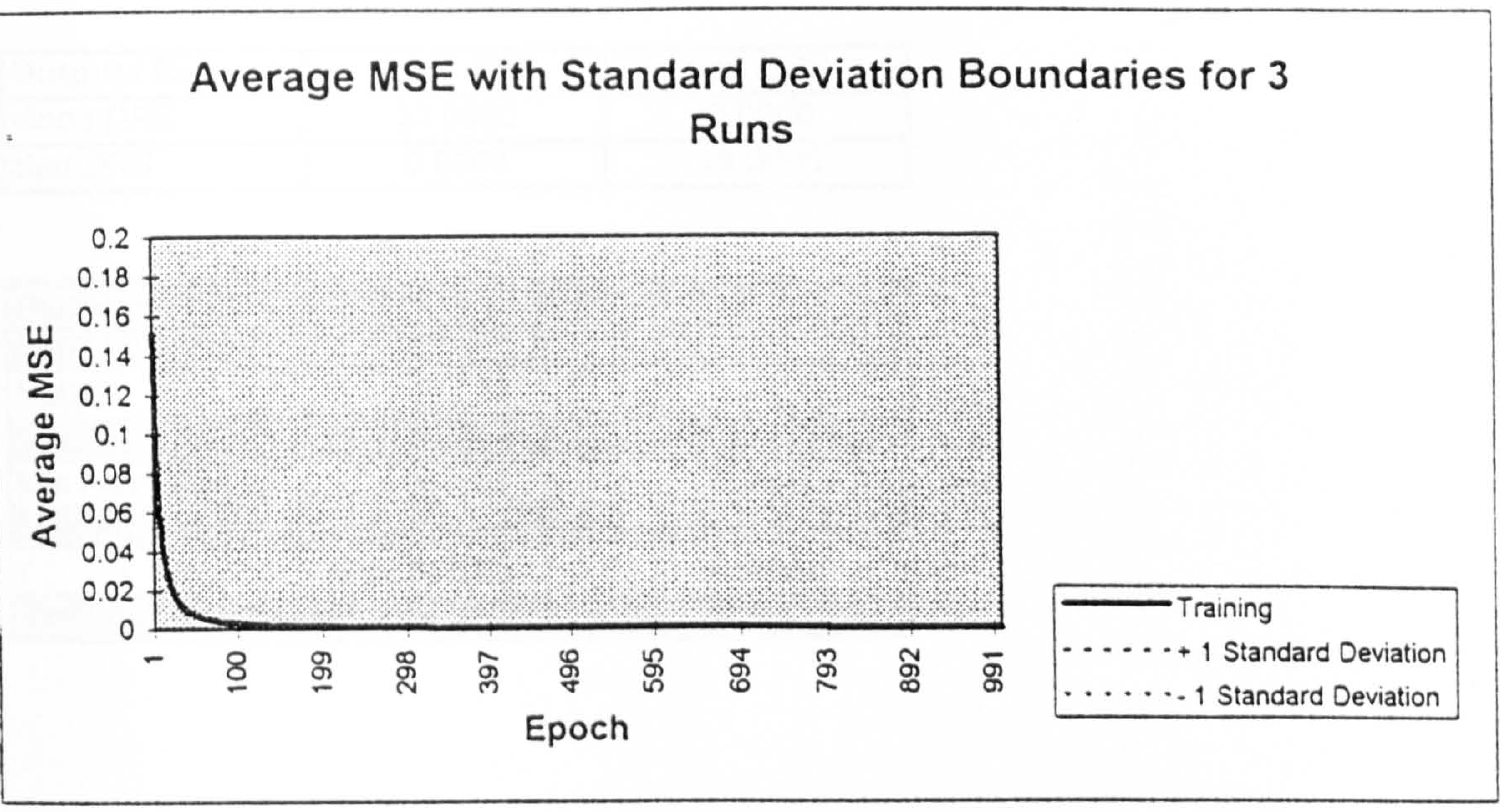
Best Network	Training
Parameter Value	21.0000
Run #	2.0000
Epoch #	994.0000
Minimum MSE	0.0001
Final MSE	0.0001



Appendix Q
Training by Multiple of 3 Runs- Stabilising the Network

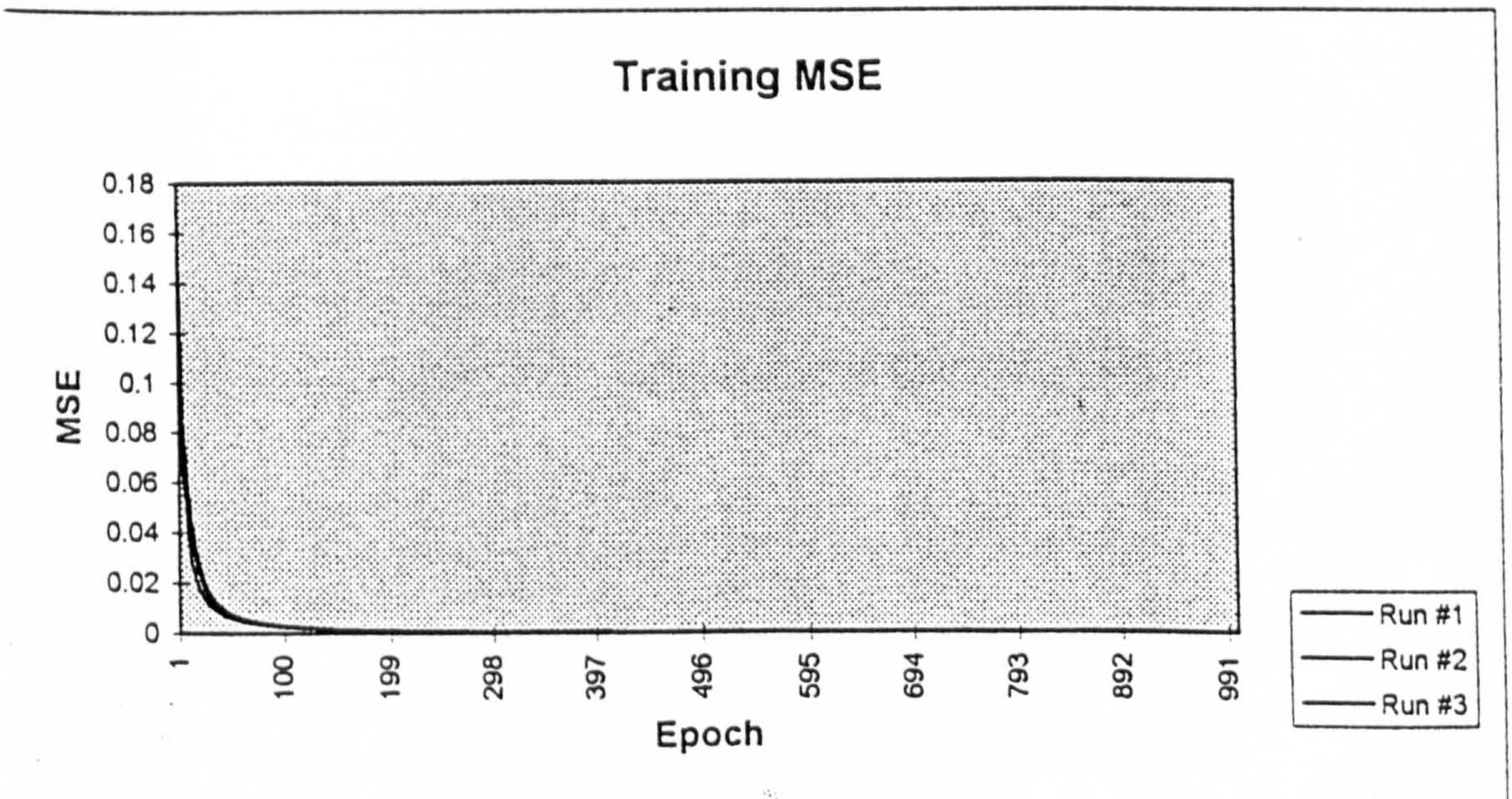


Best Network	Training
Epoch #	995.0000
Minimum MSE	0.0002
Final MSE	0.0002



All Runs	Training Minimum	Training Standard Deviation
Average of Minimum MSEs	0.0002	0.0000
Average of Final MSEs	0.0002	0.0000

Best Network	Training
Run #	2.0000
Epoch #	995.0000
Minimum MSE	0.0002
Final MSE	0.0002



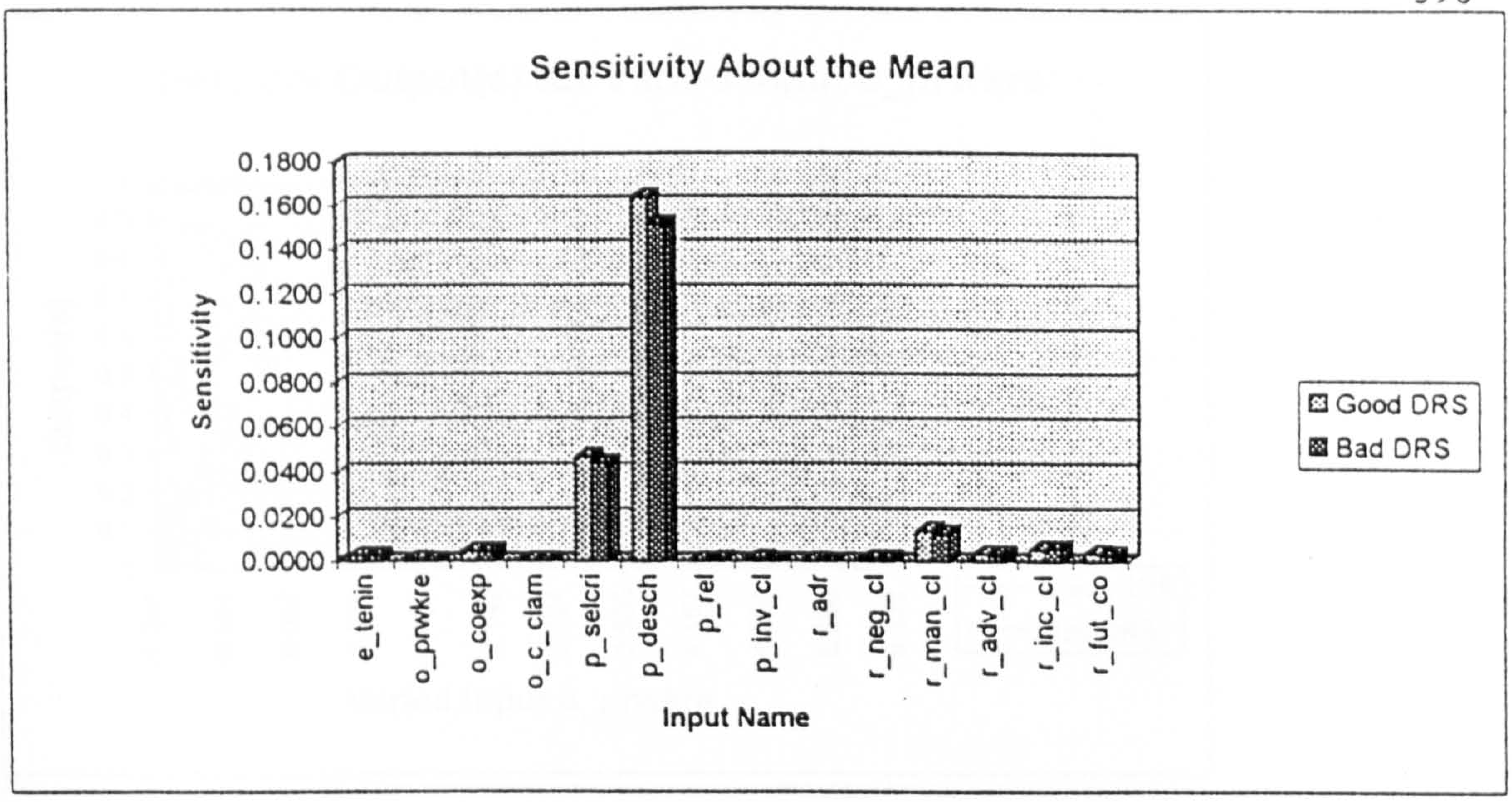
Output / Desired	*Good DRS*	*Bad DRS*
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	*Good DRS*	*Bad DRS*
MSE	0.0003	0.0003
NMSE	0.0014	0.0015
MAE	0.0114	0.0110
Min Abs Error	0.0021	0.0010
Max Abs Error	0.0579	0.0560
r	0.9996	0.9996
Percent Correct	100.0000	100.0000

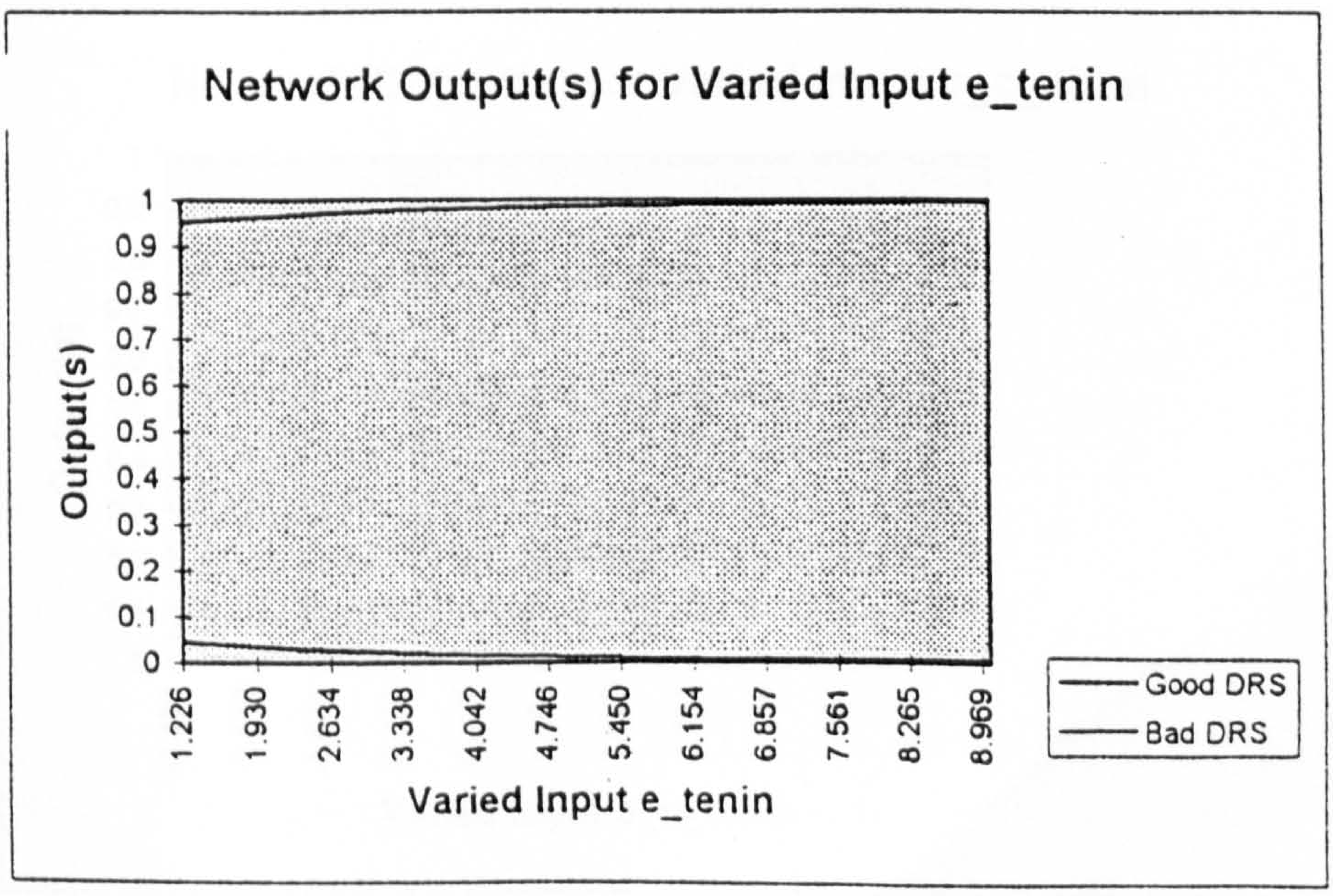
Output / Desired	Good DRS	Bad DRS
Good DRS	7.0000	0.0000
Bad DRS	2.0000	4.0000

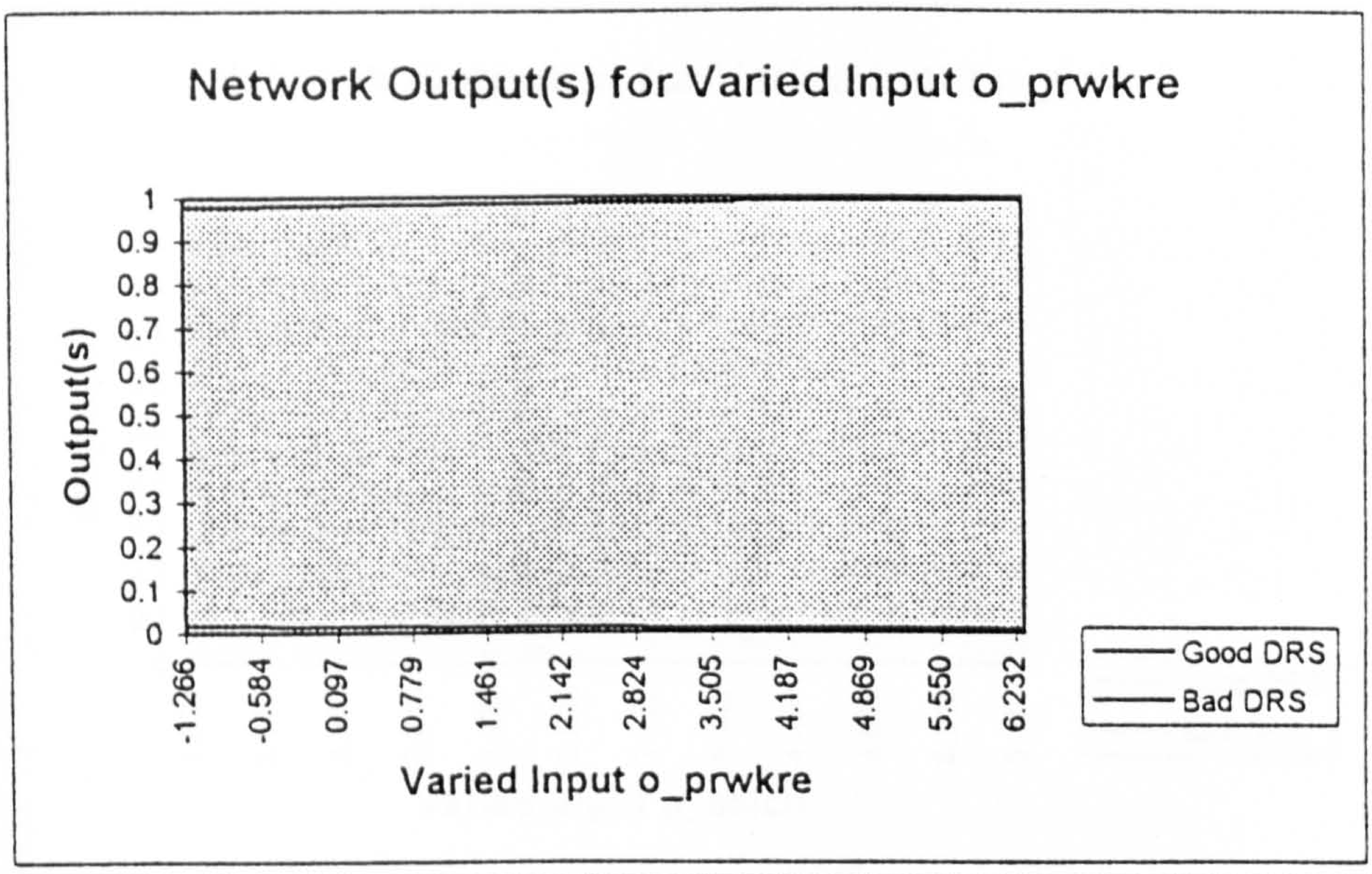
Performance	Good DRS	Bad DRS
MSE	0.1185	0.1128
NMSE	0.5563	0.5294
MAE	0.1798	0.1702
Min Abs Error	0.0028	0.0018
Max Abs Error	0.9623	0.9651
r	0.7172	0.7349
Percent Correct	77.7778	100.0000

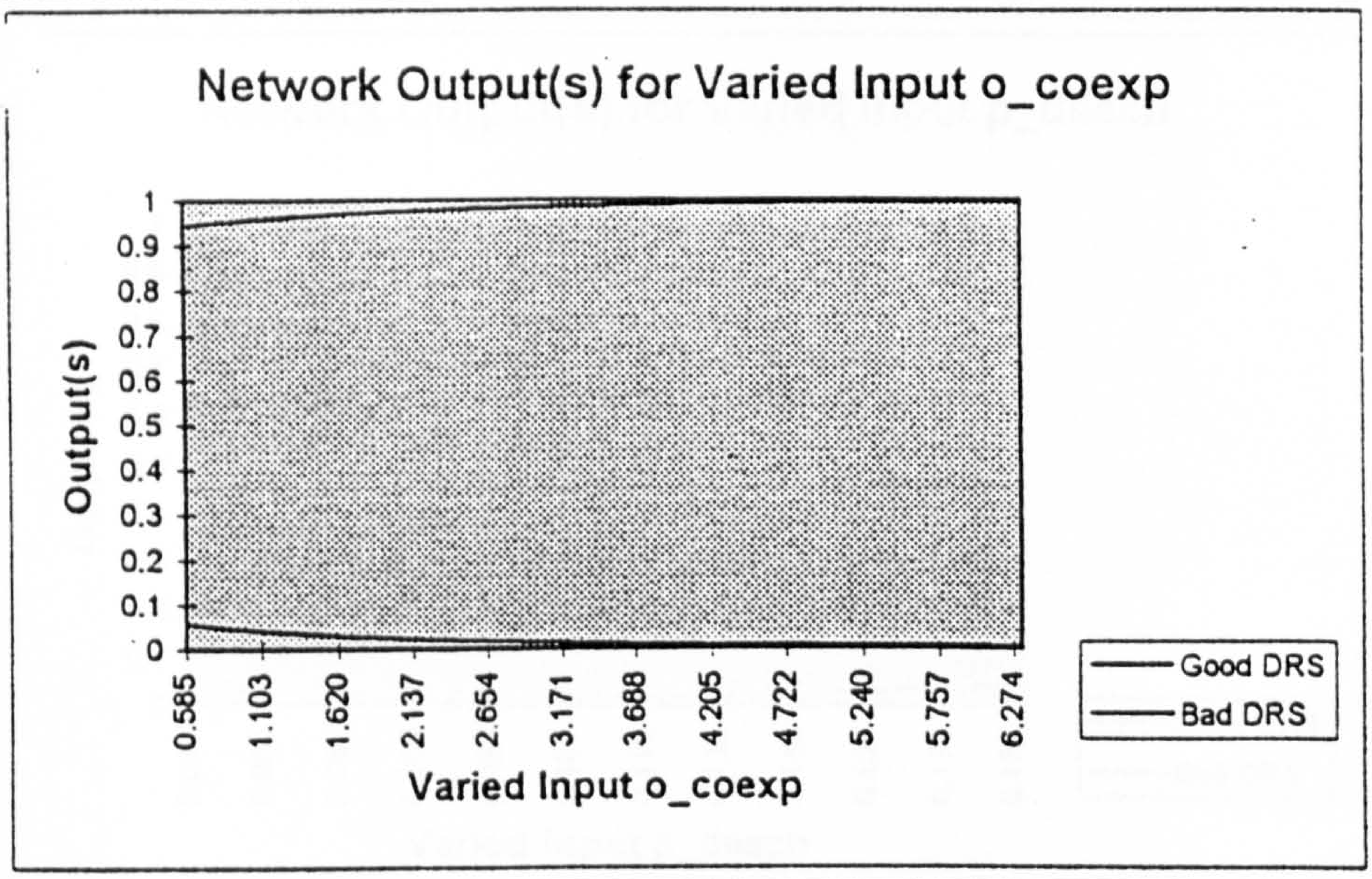
Appendix R
Sensitivity about the Mean of the `Best Network'

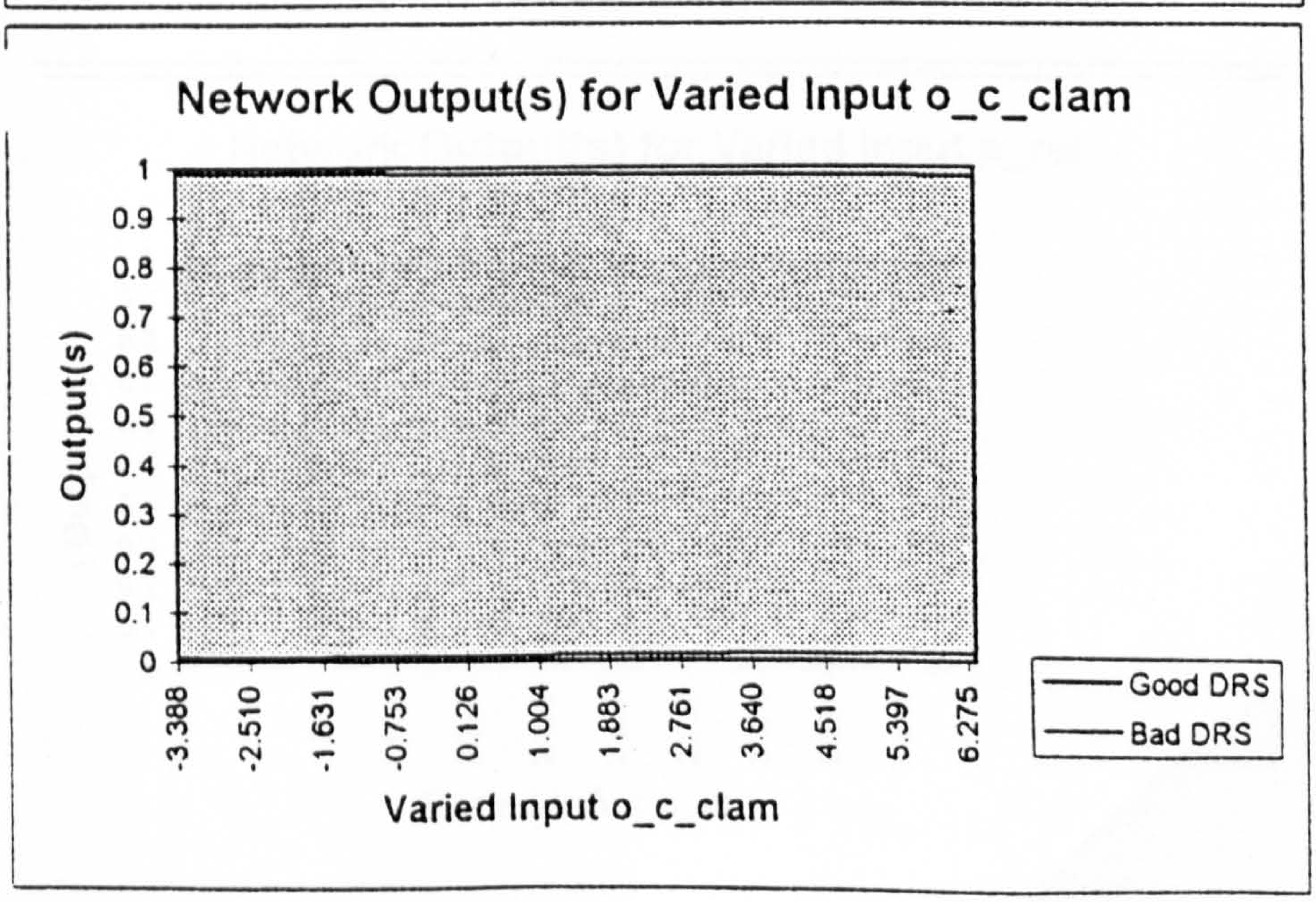


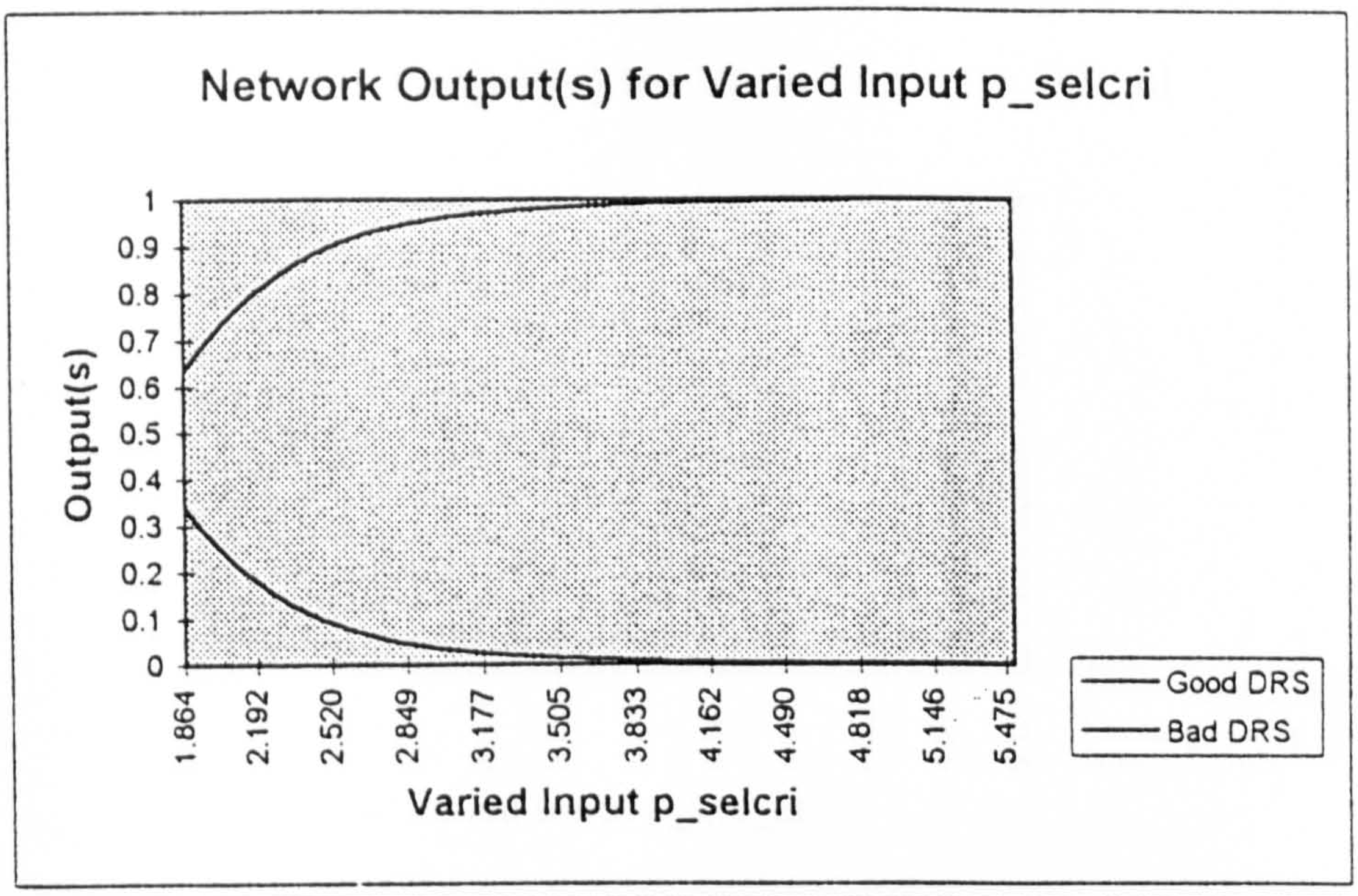
Sensitivity	Good DRS	Bad DRS
e_tenin	0.0029	0.0028
o_prwkre	0.0010	0.0006
o_coexp	0.0045	0.0049
o_c_clam	0.0005	0.0005
p_selcri	0.0467	0.0434
p_desch	0.1637	0.1513
p_rel	0.0007	0.0009
p_inv_cl	0.0013	0.0004
r_adr	0.0004	0.0001
r_neg_cl	0.0014	0.0013
r_man_cl	0.0139	0.0127
r_adv_cl	0.0035	0.0037
r_inc_cl	0.0057	0.0058
r_fut_co	0.0038	0.0037

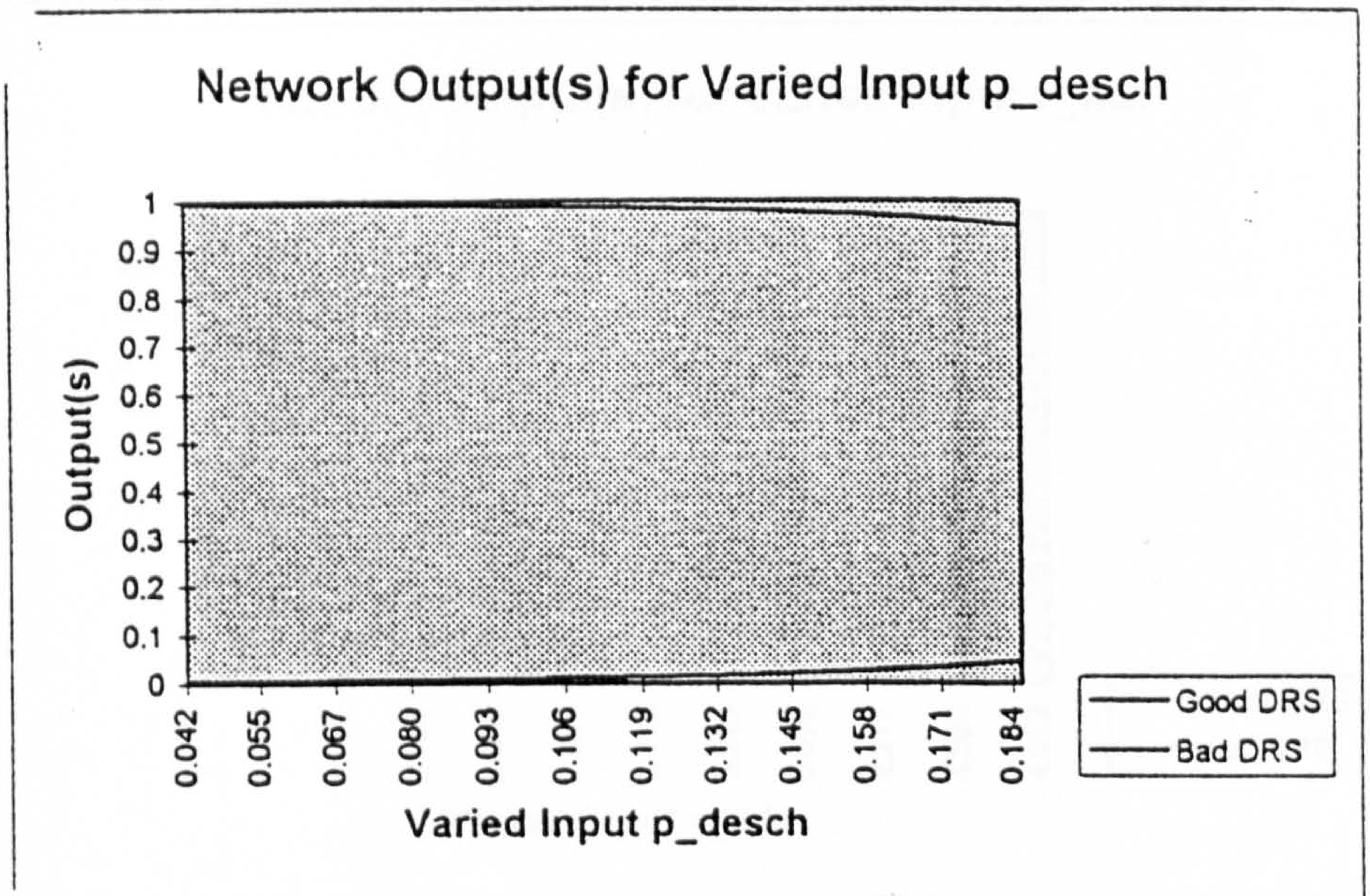


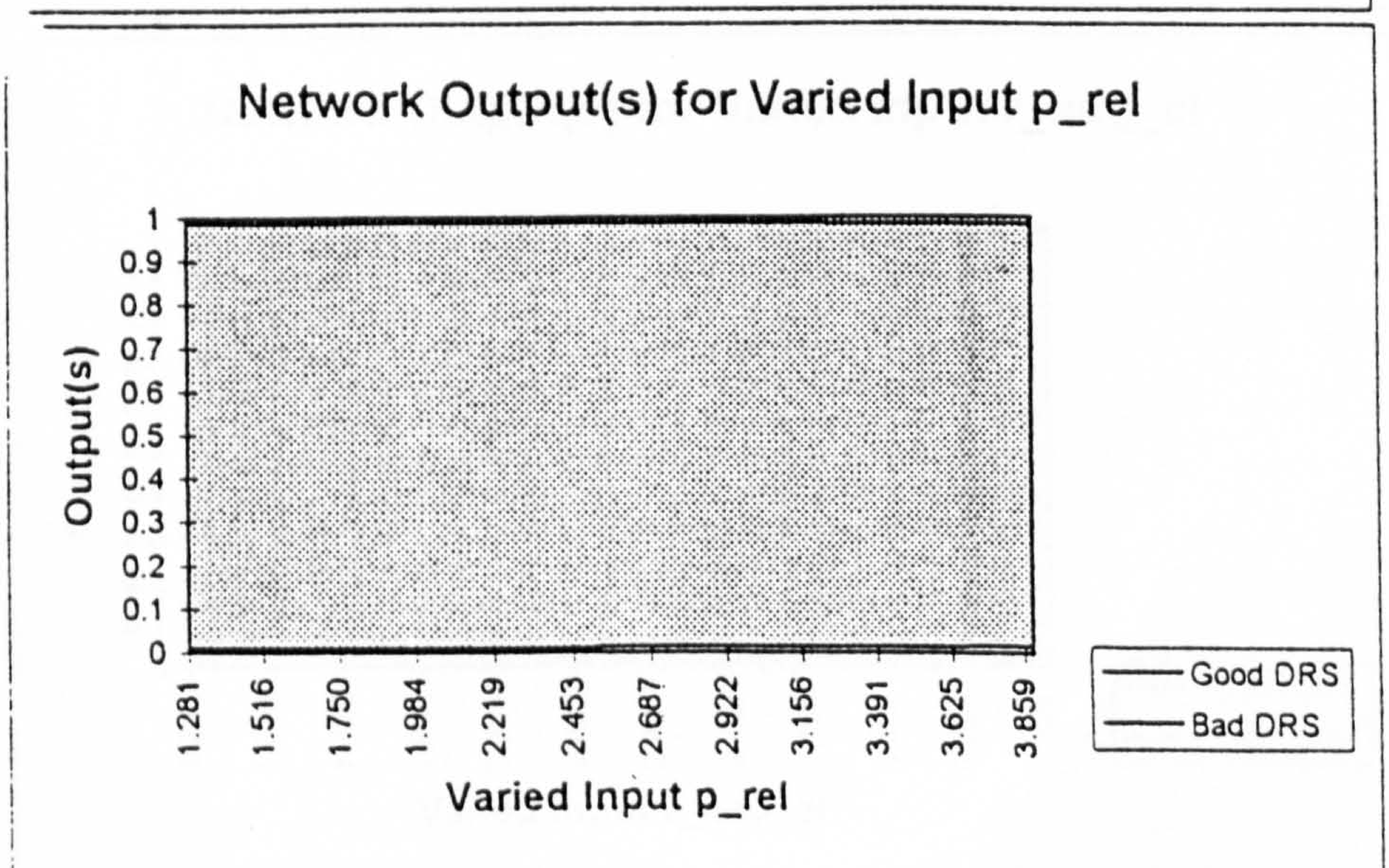

Network Output(s) for Varied Input o_prwkre
Output(s)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-1.266
-0.584
0.097
0.779
1.461
2.142
2.824
3.505
4.187
4.869
5.550
6.232
Varied Input o_prwkre
Good DRS
Bad DRS

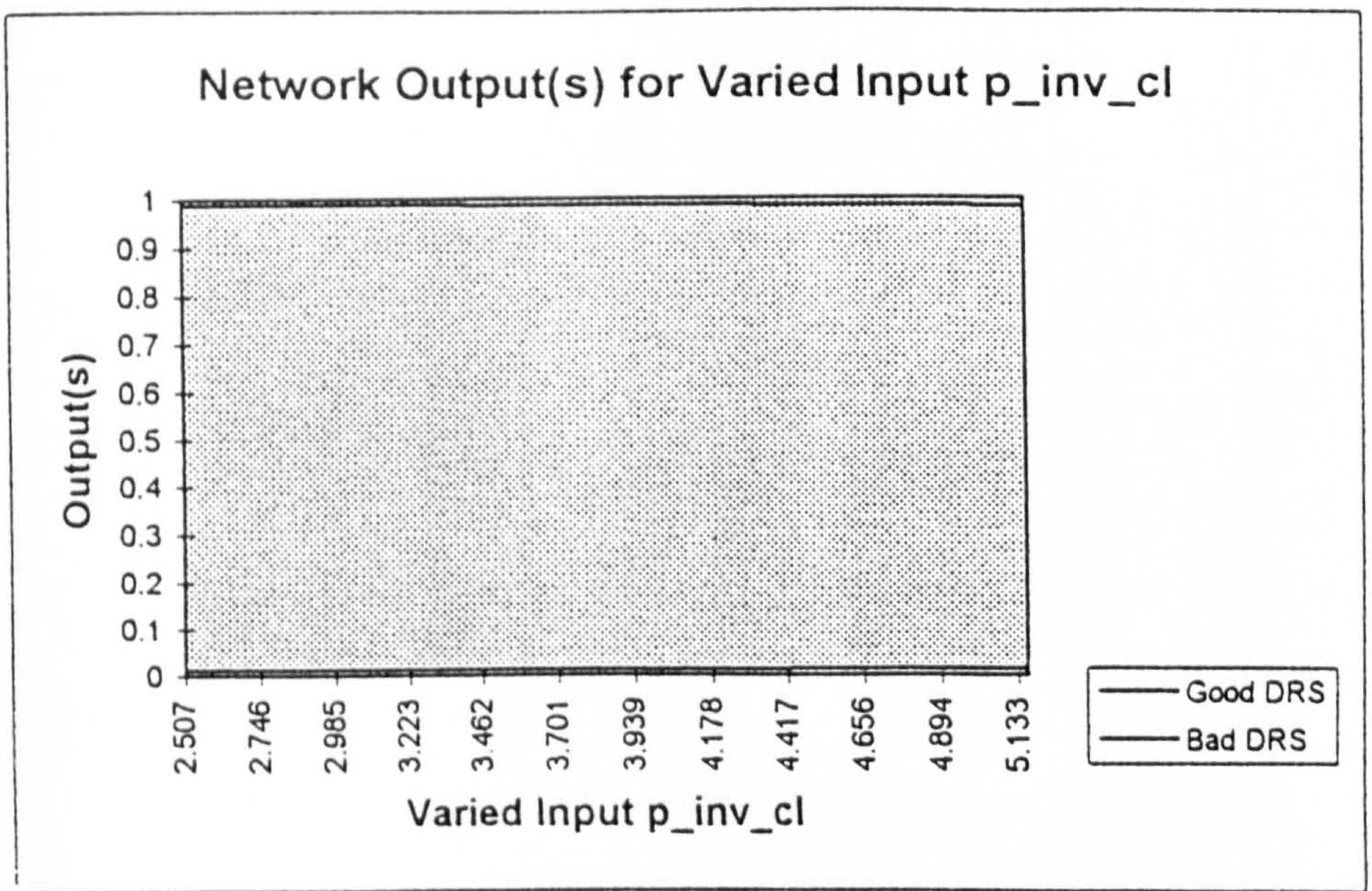

Network Output(s) for Varied Input o_coexp
Output(s)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.585
1.103
1.620
2.137
2.654
3.171
3.688
4.205
4.722
5.240
5.757
6.274
Varied Input o_coexp
Good DRS
Bad DRS

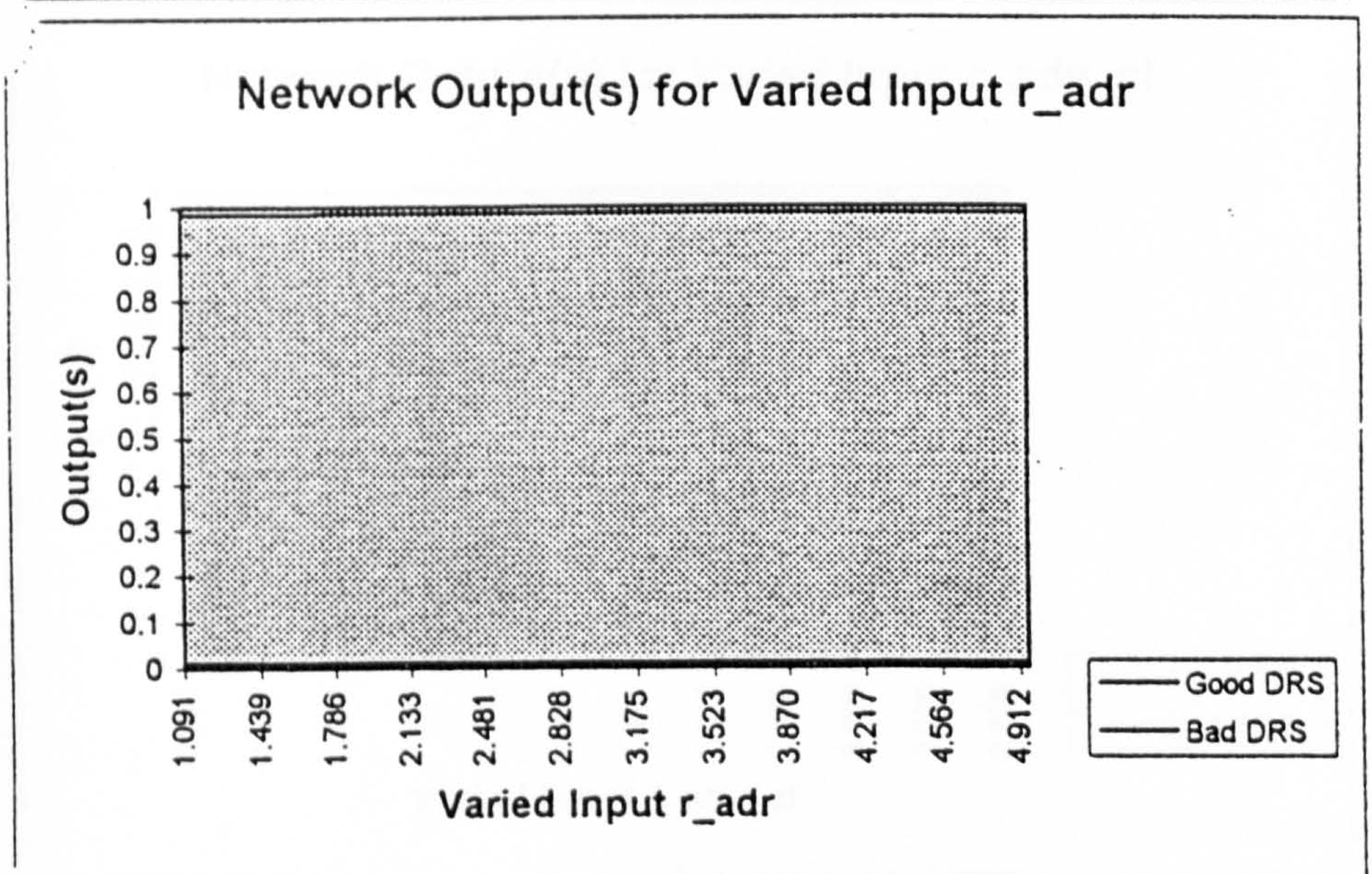

Network Output(s) for Varied Input o_c_clam
Output(s)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-3.388
-2.510
-1.631
-0.753
0.126
1.004
1.883
2.761
3.640
4.518
5.397
6.275
Varied Input o_c_clam
Good DRS
Bad DRS

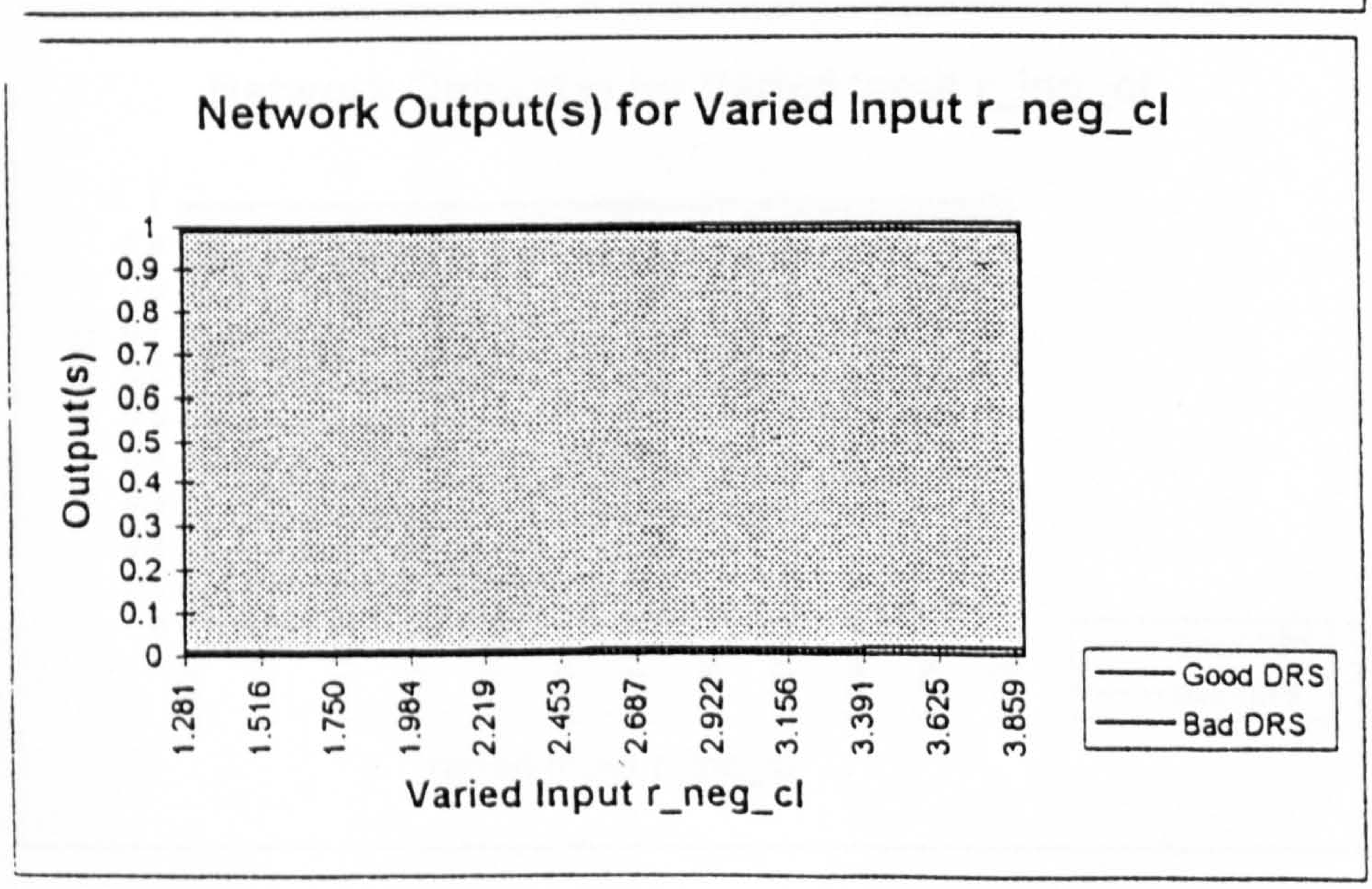

Network Output(s) for Varied Input p_selcri
Output(s)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1.864
2.192
2.520
2.849
3.177
3.505
3.833
4.162
4.490
4.818
5.146
5.475
Varied Input p_selcri
Good DRS
Bad DRS

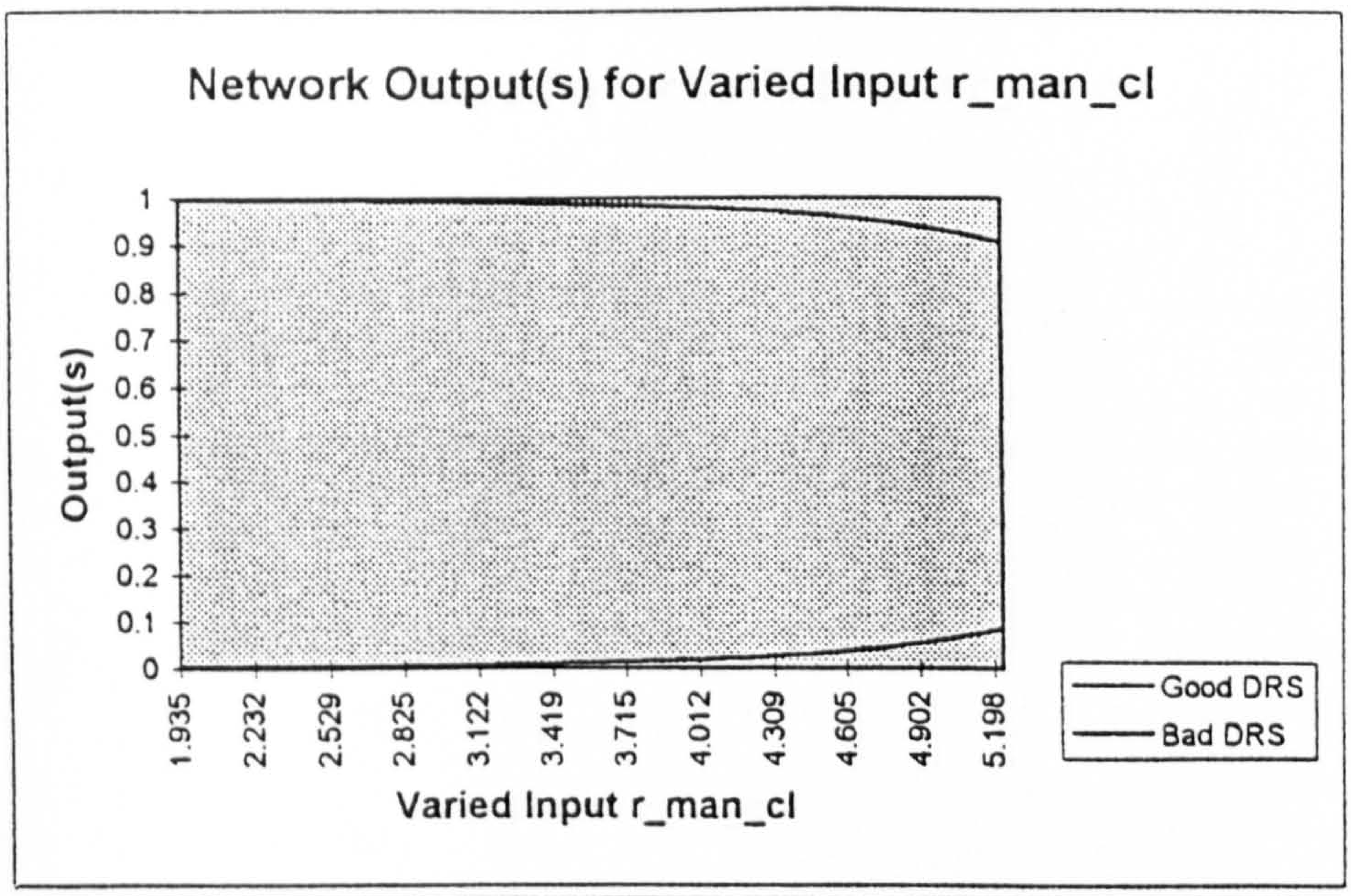

Network Output(s) for Varied Input p_desch
Output(s)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.042
0.055
0.067
0.080
0.093
0.106
0.119
0.132
0.145
0.158
0.171
0.184
Varied Input p_desch
Good DRS
Bad DRS

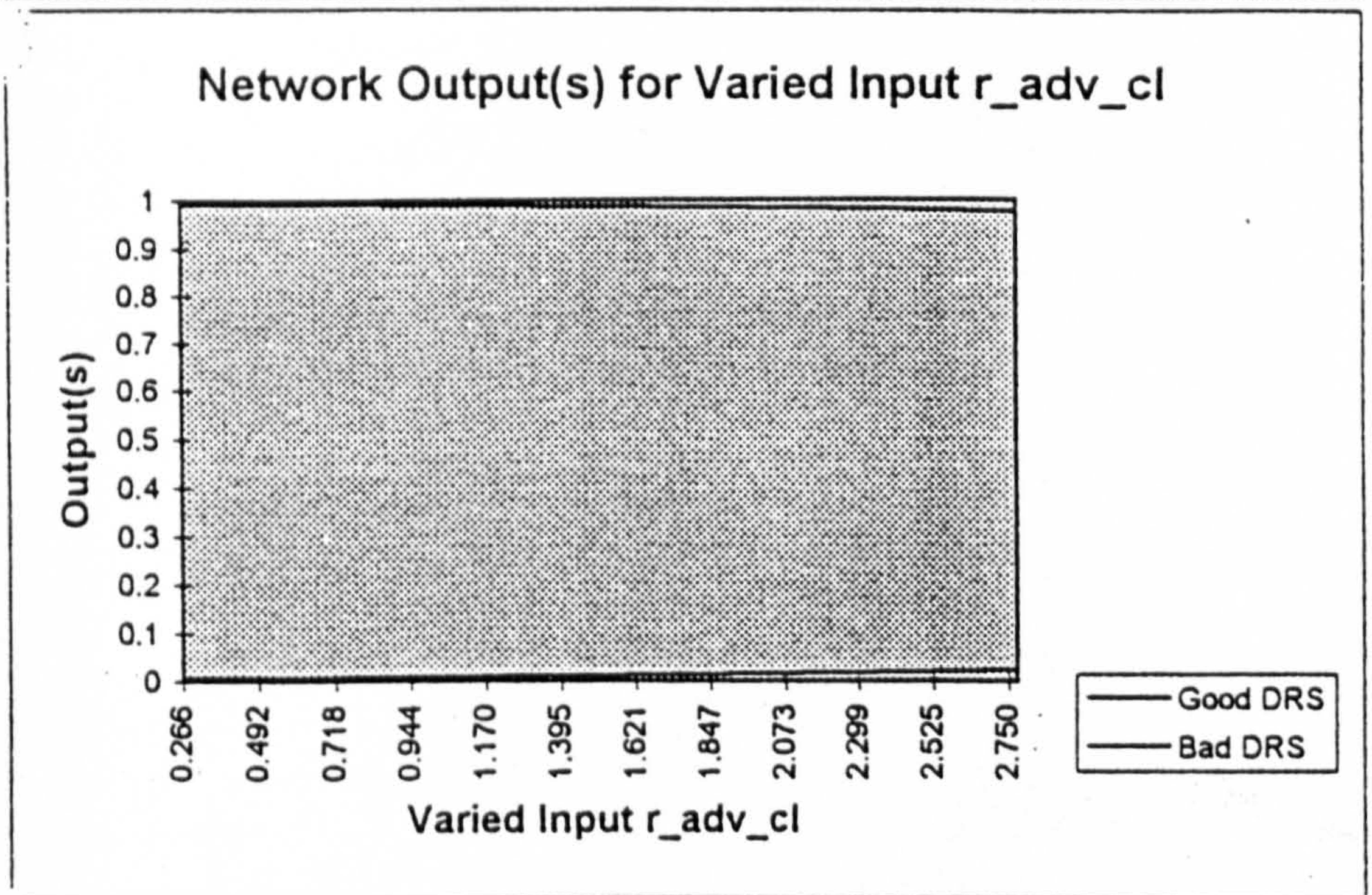

Network Output(s) for Varied Input p_rel
Output(s)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1.281
1.516
1.750
1.984
2.219
2.453
2.687
2.922
3.156
3.391
3.625
3.859
Varied Input p_rel
Good DRS
Bad DRS

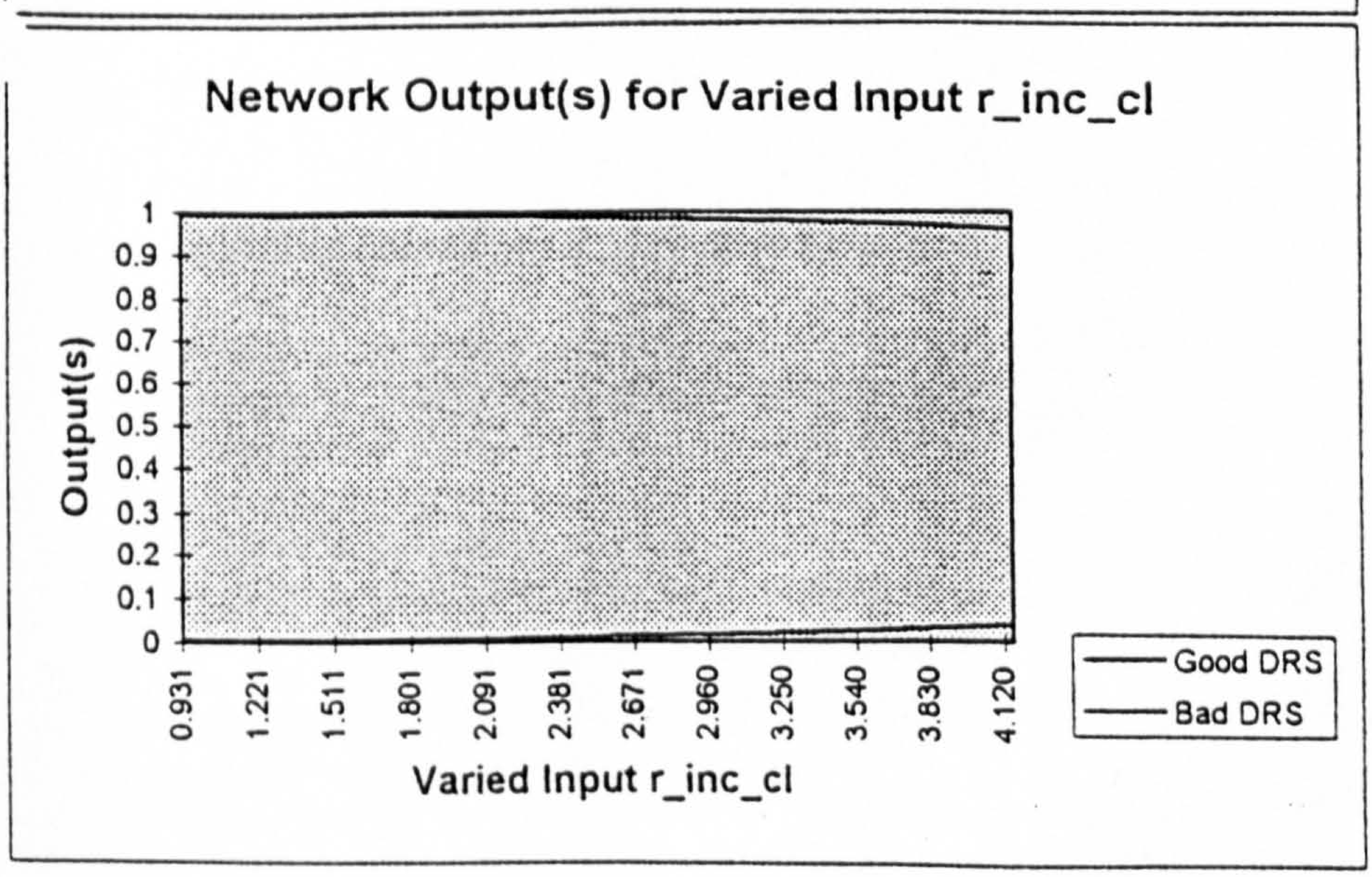

Network Output(s) for Varied Input p_inv_cl
Output(s)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2.507
2.746
2.985
3.223
3.462
3.701
3.939
4.178
4.417
4.656
4.894
5.133
Varied Input p_inv_cl
Good DRS
Bad DRS

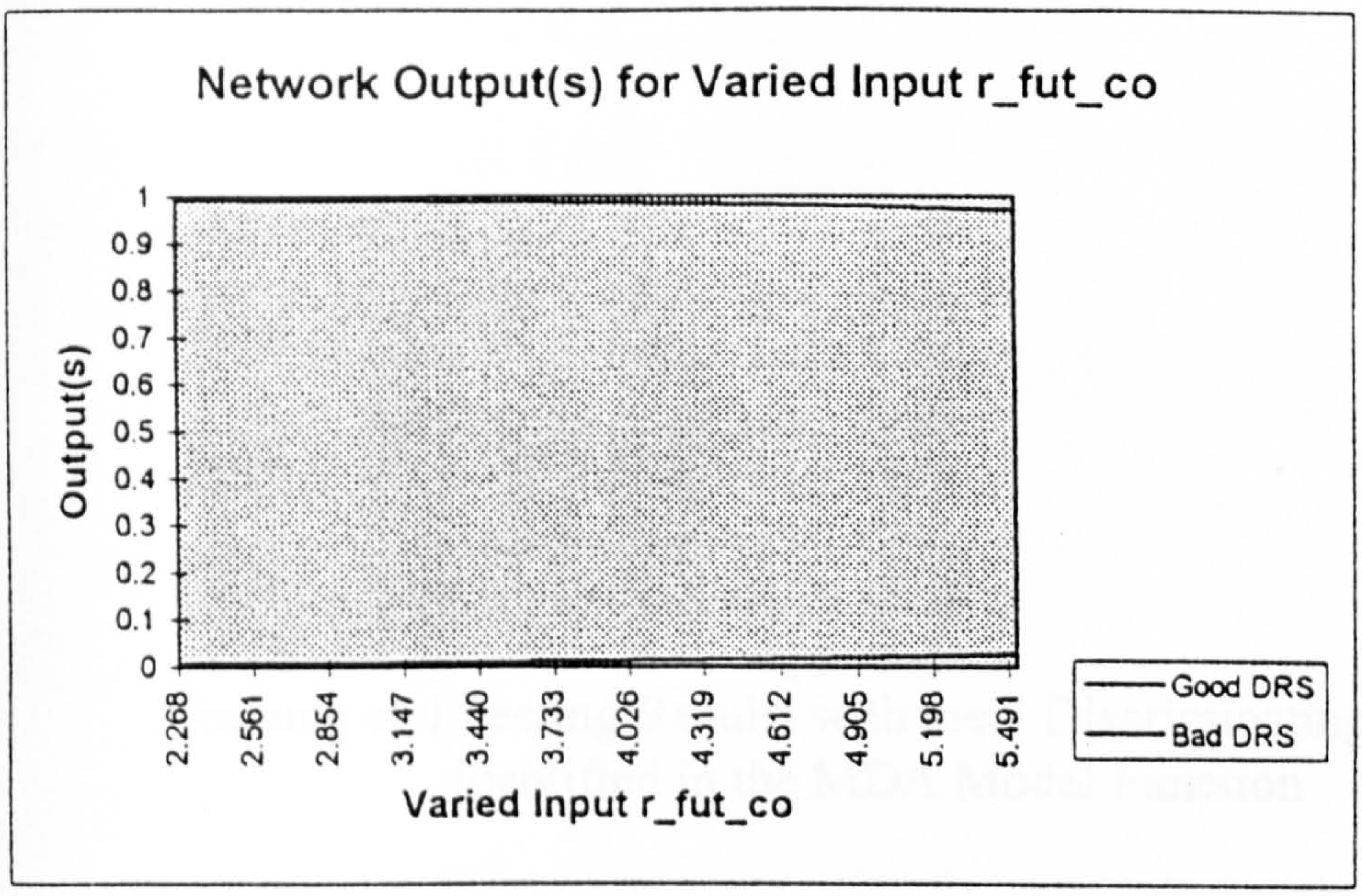

Network Output(s) for Varied Input r_adr
Output(s)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1.091
1.439
1.786
2.133
2.481
2.828
3.175
3.523
3.870
4.217
4.564
4.912
Varied Input r_adr
Good DRS
Bad DRS


Network Output(s) for Varied Input r_neg_cl
Output(s)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1.281
1.516
1.750
1.984
2.219
2.453
2.687
2.922
3.156
3.391
3.625
3.859
Varied Input r_neg_cl
Good DRS
Bad DRS

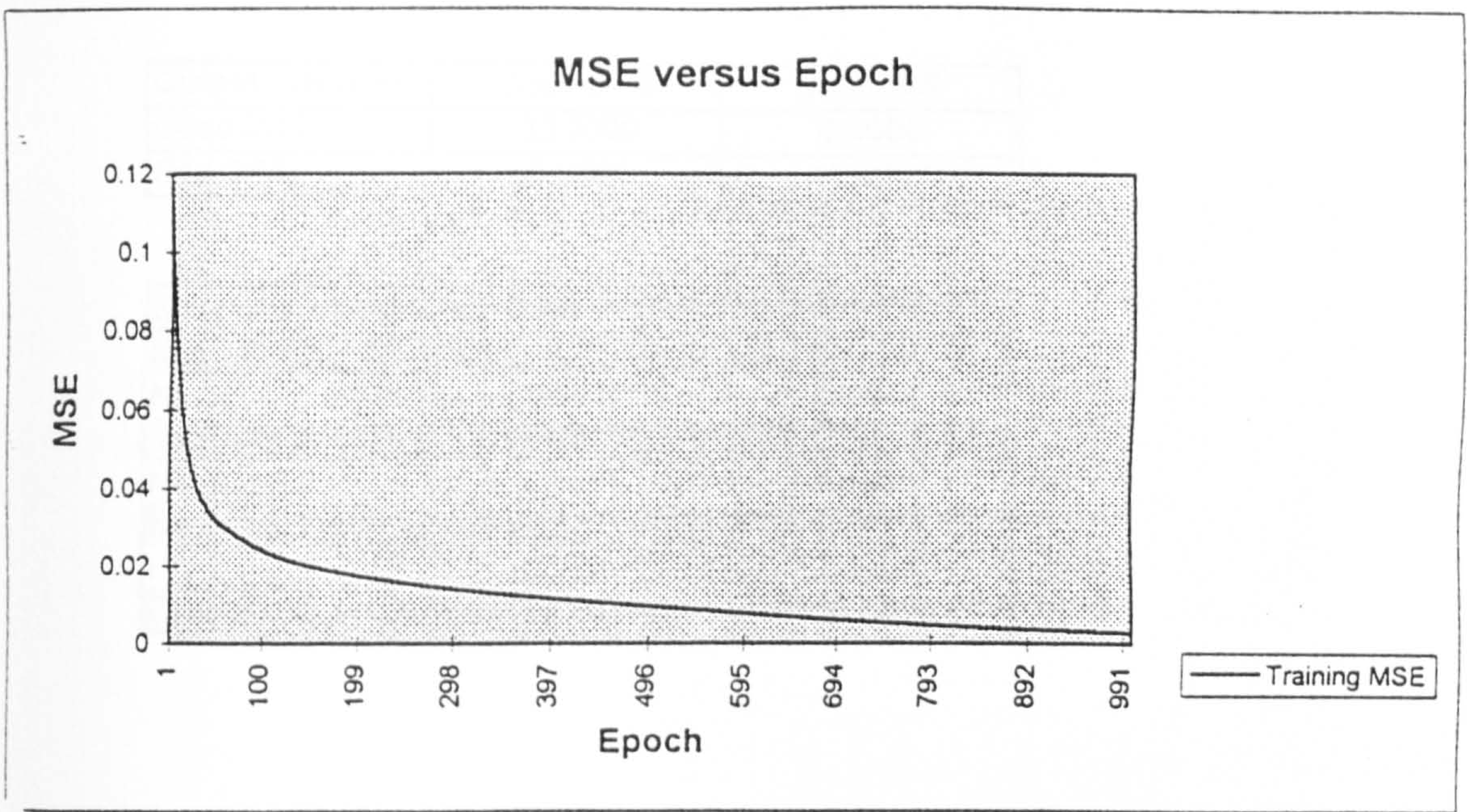

Network Output(s) for Varied Input r_man_cl
Output(s)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1.935
2.232
2.529
2.825
3.122
3.419
3.715
4.012
4.309
4.605
4.902
5.198
Varied Input r_man_cl
Good DRS
Bad DRS


Network Output(s) for Varied Input r_adv_cl
Output(s)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.266
0.492
0.718
0.944
1.170
1.395
1.621
1.847
2.073
2.299
2.525
2.750
Varied Input r_adv_cl
Good DRS
Bad DRS


Network Output(s) for Varied Input r_inc_cl
Output(s)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.931
1.221
1.511
1.801
2.091
2.381
2.671
2.960
3.250
3.540
3.830
4.120
Varied Input r_inc_cl
Good DRS
Bad DRS


Network Output(s) for Varied Input r_fut_co
Output(s)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2.268
2.561
2.854
3.147
3.440
3.733
4.026
4.319
4.612
4.905
5.198
5.491
Varied Input r_fut_co
Good DRS
Bad DRS

Appendix S
Training and Testing Results with the 8 Discriminating Variables identified in the MDA Model Function



Best Network	Training
Epoch #	1000.0000
Minimum MSE	0.0028
Final MSE	0.0028

Test-mda8cr-1-tr Report

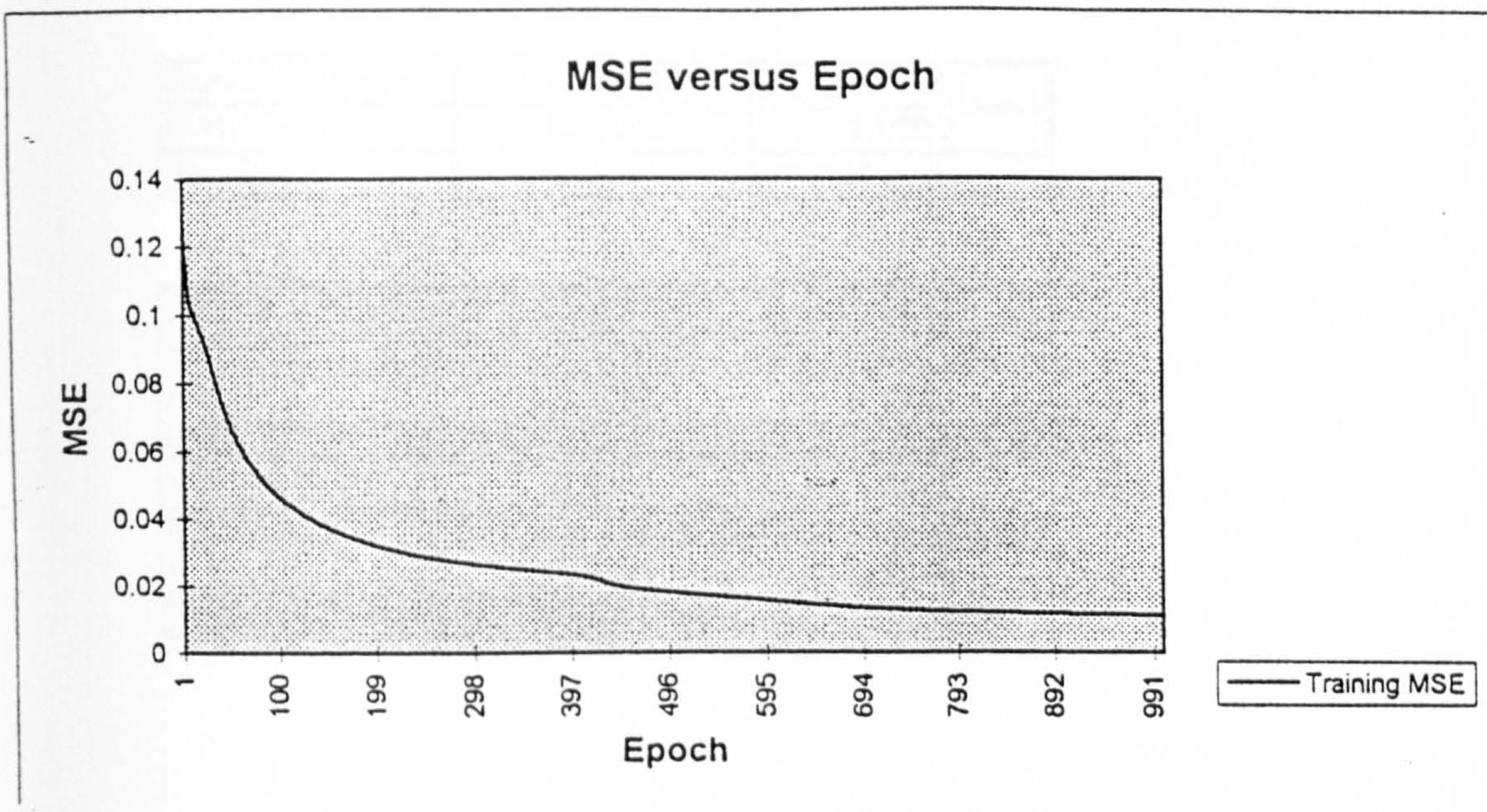
Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	0.0000
Bad DRS	0.0000	15.0000

Performance	Good DRS	Bad DRS
MSE	0.0058	0.0053
NMSE	0.0272	0.0246
MAE	0.0421	0.0412
Min Abs Error	0.0005	0.0004
Max Abs Error	0.3265	0.3035
r	0.9891	0.9905
Percent Correct	100.0000	100.0000

Test-mda8cr-1-te Report

Output / Desired	Good DRS	Bad DRS
Good DRS	6.0000	2.0000
Bad DRS	3.0000	2.0000

Performance	Good DRS	Bad DRS
MSE	0.2945	0.3061
NMSE	1.3826	1.4371
MAE	0.3765	0.3829
Min Abs Error	0.0066	0.0055
Max Abs Error	0.9920	0.9885
r	0.2408	0.2162
Percent Correct	66.6667	50.0000



Best Network	*Training*
Epoch #	1000.0000
Minimum MSE	0.0111
Final MSE	0.0111

Test-mda8cr-2-tr Report

Output / Desired	Good DRS	Bad DRS
Good DRS	33.0000	1.0000
Bad DRS	0.0000	14.0000

Performance	Good DRS	Bad DRS
MSE	0.0223	0.0221
NMSE	0.1036	0.1026
MAE	0.0803	0.0840
Min Abs Error	0.0325	0.0413
Max Abs Error	0.9246	0.8931
r	0.9511	0.9548
Percent Correct	100.0000	93.3333

Test-mda8cr-2-te Report

Output / Desired	Good DRS	Bad DRS
Good DRS	7.0000	2.0000
Bad DRS	2.0000	2.0000

Performance	Good DRS	Bad DRS
MSE	0.2812	0.2723
NMSE	1.3201	1.2785
MAE	0.3532	0.3534
Min Abs Error	0.0335	0.0449
Max Abs Error	0.9667	0.9550
r	0.2213	0.2219
Percent Correct	77.7778	50.0000

Appendix T
RII Study Questionnaire for the Clients' Sample

University of Wolverhampton
Construction Dispute Resolution: Questionnaire Survey

Thank you for supporting the captioned research programme by providing data of the project ________________________________.
Preliminary analysis has identified the following fourteen critical factors that affect the outcome of a resolution process. This stage of the research programme seeks to examine the relative importance of these fourteen factors. The data collected will be solely used for the aforementioned research purpose and will be treated in the strictest confidence. Thank you for your continuing support to this research.

Direction:
Consider the largest dispute arised in the project, select from a scale of 1 to 9, indicating the importance of the following factors that affect the final resolution outcome of the dispute.

1 = Not important at all.
3 = Not important
5 = Neutral
7 = Important
9 = Very important

1.	The rise in tender price index of the construction industry.	1 2 3 4 5 6 7 8 9
2.	The claim consciousness of the contractor.	1 2 3 4 5 6 7 8 9
3.	The contractor's experience in the type of construction.	1 2 3 4 5 6 7 8 9
4.	The previous working relationship between the client and the contractor.	1 2 3 4 5 6 7 8 9
5.	The degree of design changes of the project.	1 2 3 4 5 6 7 8 9
6.	The degree of involvement of the client in the running of the project	1 2 3 4 5 6 7 8 9
7.	The relationship between the project personnel.	1 2 3 4 5 6 7 8 9
8.	The criteria adopted by the client in selecting the contractor.	1 2 3 4 5 6 7 8 9
9.	The contractual provision requiring the use of ADR processes to resolve the dispute.	1 2 3 4 5 6 7 8 9
10.	The degree of involvement of external claim advisor in the dispute resolution process.	1 2 3 4 5 6 7 8 9
11.	The direct, tangible, personal incentive of the client to resolve the dispute.	1 2 3 4 5 6 7 8 9
12.	The degree of senior management involvement of the client in the resolution process.	1 2 3 4 5 6 7 8 9
13.	The possibility of future work with the same client.	1 2 3 4 5 6 7 8 9
14.	The negotiating skill of the client dispute resolution team.	1 2 3 4 5 6 7 8 9

End of Questionnaire!

Appendix U
RII Study Questionnaire for the Contractors' Sample

University of Wolverhampton

Questionnaire Survey
Factors Affecting Construction Dispute Resolution

This survey is part of a PhD research programme registered at University of Wolverhampton, United kingdom. The research seeks to investigate factors that affect the final resolution outcome of a dispute. The data collected will be solely used for the aforementioned research purpose and will be treated in the strictest confidence. Thank you for your support to this research.

Directions:

This survey packet collects information in relation to completed construction projects. Please complete a separate packet for EACH project to be surveyed. The project should have no outstanding unsettled disputes (not necessary if the project already had arbitration proceedings held or in progress). Each packet would take approximately 15 minutes to answer. The survey contains 22 questions and divided into 2 sections:

Section One: Project Background data.
Section Two: Factors affecting dispute resolution

Definitions:

Disputes:
Matters over which the decision of the contract administrator is disagreed by either or both parties.

Alternative Dispute Resolution processes:
These include conciliation, mediation, mini-trial and the like (Negotiation, arbitration and litigation do not belong to the class of alternative dispute resolution process).

Section One - Project background data:

1. Title of Project:

____

2. The period during which the project was constructed:

Project duration ______ (months) Period: ______________________

3. What was the type of project for which this survey was completed?

Public housing	1
Residential	2
Industrial	3
Commercial	4
Civil Engineering	5
Others please specify	________

4. What role did the contractor play in this project?

General contractor	1
Design and Build contractor	2
Construction Manager	3
Build, operate and transfer	4
Others please specify	________

5. The contract value (HK$) of the project was:

<10	mill	1
10 - 50	mill	2
50 - 100	mill	3
100 - 200	mill	4
200 - 500	mill	5
over 500	mill	6

6. What was the general payment method used by this project?

Monthly progress payments	1
Stage payments	2
Milestone payments	3
Lump sum payment on completion	4
Others please specify	________

7. What was the conditions of contract used ?

The Standard form of Building Contracts (HKIA) form		1
Hong Kong Government form		2
Hong Kong Government Airport Core Program form		3
Other standard forms	________	4
Specially drafted for the project		5
Others please specify	________	6

8. Consider the largest dispute, at what stage was the dispute resolved or settled?

No argument over the decision of the contract administrator		1
Negotiation between project personnel		2
Alternative dispute resolution processes		3
Negotiation after notice of arbitration served		4
Arbitration		5
Litigation		6
Others please specify	________	7

Section Two - Factors affecting dispute resolution in construction:

Consider the largest dispute arised in the project, select from a scale of 1 to 9, indicating the importance of the following factors that affect the final resolution outcome of the dispute.

1 = Not important at all
3 = Not important
5 = Neutral
7 = Important
9 = Very Important

*** Please delete the inappropriate item**

9.	The rise in tender price index of the construction industry.	1 2 3 4 5 6 7 8 9
10.	The claim consciousness of the contractor.	1 2 3 4 5 6 7 8 9
11.	The contractor's experience in the type of construction.	1 2 3 4 5 6 7 8 9
12.	The previous working relationship between the client and the contractor.	1 2 3 4 5 6 7 8 9
13.	The degree of design changes of the project.	1 2 3 4 5 6 7 8 9
14.	The degree of involvement of the client in the running of the project	1 2 3 4 5 6 7 8 9
15.	The relationship between the project personnel.	1 2 3 4 5 6 7 8 9
16.	The criteria adopted by the client in selecting the contractor.	1 2 3 4 5 6 7 8 9
17.	The contractual provision requiring the use of ADR processes to resolve the dispute.	1 2 3 4 5 6 7 8 9
18.	The degree of involvement of external claim advisor in the dispute resolution process.	1 2 3 4 5 6 7 8 9
19.	The direct, tangible, personal incentive of the *client/contractor to resolve the dispute.	1 2 3 4 5 6 7 8 9
20.	The degree of senior management involvement of the client in the resolution process.	1 2 3 4 5 6 7 8 9
21.	The possibility of future work with the same client/contractor.	1 2 3 4 5 6 7 8 9
22.	The negotiating skill of the client/contractor dispute resolution team.	1 2 3 4 5 6 7 8 9

End of Questionnaire
Thank you for your support to this research!

Appendix V
Principal Component Factor Analysis on the 8 Discriminating Variables

- - - - - - - - - - - F A C T O R   A N A L Y S I S - - - - - - - - - - -

Analysis number 1   Listwise deletion of cases with missing values

	Mean	Std Dev	Label
E_TENIN	5.31297	3.72744	TENDER PRICE INDEX
O_C_CLAM	.77441	1.39571	CLAIM CONSCIOUSNESS 1
P_DESCH	.12564	.07686	Design Changes
P_REL	2.70492	1.35824	RELATIONSHIP BETWEEN PROJECT PERSONNEL
R_ADR	3.13115	1.90154	CONTRACTUAL USE OF ADR
R_ADV_CL	1.73770	1.45947	CLIENT ADVISOR INVOLVEMENT
R_INC_CL	2.67213	1.64034	SETTLEMENT INCENTIVE OF CLIENT
R_MAN_CL	3.70492	1.54212	CLIENT SENIOR MANAGEMENT INVOLVEMENT

Number of Cases = 61

Correlation Matrix:

	E_TENIN	O_C_CLAM	P_DESCH	P_REL	R_ADR	R_ADV_CL	R_INC_CL
E_TENIN	1.00000						
O_C_CLAM	-.18814	1.00000					
P_DESCH	-.01292	.14083	1.00000				
P_REL	.03934	-.08697	.16979	1.00000			
R_ADR	.10924	-.15621	.00797	.06041	1.00000		
R_ADV_CL	.00058	-.05392	.29407	.13687	.16274	1.00000	
R_INC_CL	-.03026	-.06852	.25511	.19523	.15294	.20714	1.00000
R_MAN_CL	-.07643	.13753	.11284	.33968	.29760	.30568	.23125

	R_MAN_CL
R_MAN_CL	1.00000

Determinant of Correlation Matrix = .4640843

Inverse of Correlation Matrix:

	E_TENIN	O_C_CLAM	P_DESCH	P_REL	R_ADR
E_TENIN	1.05704				
O_C_CLAM	.16658	1.17348			

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	E_TENIN	O_C_CLAM	P_DESCH	P_REL	R_ADR
P_DESCH	-.02474	-.23400	1.21048		
P_REL	-.06244	.18811	-.16650	1.20549	
R_ADR	-.12578	.20895	.02877	.10583	1.18005
R_ADV_CL	.00053	.14528	-.32890	.03247	-.06579
R_INC_CL	.05649	.12051	-.25263	-.10330	-.09492
R_MAN_CL	.10609	-.32061	.10064	-.43887	-.38667

	R_ADV_CL	R_INC_CL	R_MAN_CL
R_ADV_CL	1.22872		
R_INC_CL	-.08031	1.16389	
R_MAN_CL	-.33130	-.16501	1.44442

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .55025

Bartlett Test of Sphericity = 43.37443, Significance = .03201

Anti-image Covariance Matrix:

	E_TENIN	O_C_CLAM	P_DESCH	P_REL	R_ADR
E_TENIN	.94604				
O_C_CLAM	.13429	.85217			
P_DESCH	-.01934	-.16473	.82612		
P_REL	-.04900	.13298	-.11410	.82954	
R_ADR	-.10084	.15089	.02014	.07440	.84742
R_ADV_CL	.00041	.10076	-.22113	.02192	-.04537
R_INC_CL	.04592	.08823	-.17931	-.07363	-.06911
R_MAN_CL	.06949	-.18915	.05756	-.25204	-.22685

	R_ADV_CL	R_INC_CL	R_MAN_CL
R_ADV_CL	.81386		
R_INC_CL	-.05616	.85918	
R_MAN_CL	-.18667	-.09816	.69232

----------- F A C T O R   A N A L Y S I S -----------

Anti-image Correlation Matrix:

	E_TENIN	O_C_CLAM	P_DESCH	P_REL	R_ADR	R_ADV_CL	R_INC_CL
E_TENIN	.53470						
O_C_CLAM	.14957	.35861					
P_DESCH	-.02187	-.19633	.53888				
P_REL	-.05531	.15816	-.13783	.55151			
R_ADR	-.11262	.17756	.02407	.08873	.54348		
R_ADV_CL	.00046	.12099	-.26969	.02668	-.05464	.63251	
R_INC_CL	.05093	.10312	-.21284	-.08721	-.08100	-.06715	.70992
R_MAN_CL	.08586	-.24626	.07611	-.33259	-.29617	-.24868	-.12727

	R_MAN_CL
R_MAN_CL	.52584

Measures of Sampling Adequacy (MSA) are printed on the diagonal.

1-tailed Significance of Correlation Matrix:

' . ' is printed for diagonal elements.

	E_TENIN	O_C_CLAM	P_DESCH	P_REL	R_ADR
E_TENIN	.				
O_C_CLAM	.07325	.			
P_DESCH	.46065	.13951	.		
P_REL	.38169	.25255	.09540	.	
R_ADR	.20099	.11465	.47570	.32188	.
R_ADV_CL	.49823	.33990	.01071	.14644	.10508
R_INC_CL	.40847	.29989	.02362	.06580	.11965
R_MAN_CL	.27911	.14526	.19328	.00370	.00992

	R_ADV_CL	R_INC_CL	R_MAN_CL
R_ADV_CL	.		
R_INC_CL	.05460	.	
R_MAN_CL	.00830	.03647	.

----------- F A C T O R   A N A L Y S I S -----------

Extraction 1 for analysis 1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
E_TENIN	1.00000	*	1	2.00561	25.1	25.1
O_C_CLAM	1.00000	*	2	1.33667	16.7	41.8
P_DESCH	1.00000	*	3	1.02923	12.9	54.6
P_REL	1.00000	*	4	.92295	11.5	66.2
R_ADR	1.00000	*	5	.87348	10.9	77.1
R_ADV_CL	1.00000	*	6	.77508	9.7	86.8
R_INC_CL	1.00000	*	7	.62912	7.9	94.7
R_MAN_CL	1.00000	*	8	.42786	5.3	100.0

PC extracted 3 factors.

Factor Matrix:

	Factor 1	Factor 2	Factor 3
R_MAN_CL	.70071	.10513	-.49478
R_ADV_CL	.63236	.01846	.17074
R_INC_CL	.59643	-.00509	.21731
P_REL	.55275	-.06952	.01180
O_C_CLAM	-.02313	.76957	-.18829
E_TENIN	-.00353	-.62569	.34963
R_ADR	.44086	-.46479	-.45238
P_DESCH	.50849	.34735	.58784

Final Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
E_TENIN	.51374	*	1	2.00561	25.1	25.1
O_C_CLAM	.62823	*	2	1.33667	16.7	41.8
P_DESCH	.72477	*	3	1.02923	12.9	54.6

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Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
P_REL	.31050	*				
R_ADR	.61504	*				
R_ADV_CL	.42937	*				
R_INC_CL	.40299	*				
R_MAN_CL	.74686	*				

Reproduced Correlation Matrix:

	E_TENIN	O_C_CLAM	P_DESCH	P_REL	R_ADR
E_TENIN	.51374*	.35913	.00069	-.00633	-.02185
O_C_CLAM	-.54726	.62823*	-.00404	-.01847	.12651
P_DESCH	-.01360	.14487	.72477*	-.09406	.21118
P_REL	.04567	-.06851	.26386	.31050*	-.21025
R_ADR	.13110	-.28271	-.20321	.27066	.61504*
R_ADV_CL	.04592	-.03257	.42832	.35027	.19297
R_INC_CL	.07706	-.05863	.42926	.33260	.16700
R_MAN_CL	-.24124	.15786	.10197	.37417	.48388

	R_ADV_CL	R_INC_CL	R_MAN_CL
E_TENIN	-.04534	-.10732	.16481
O_C_CLAM	-.02135	-.00989	-.02032
P_DESCH	-.13425	-.17415	.01088
P_REL	-.21340	-.13736	-.03449
R_ADR	-.03023	-.01406	-.18628
R_ADV_CL	.42937*	-.20703	-.05489
R_INC_CL	.41417	.40299*	-.07862
R_MAN_CL	.36057	.30987	.74686*

The lower left triangle contains the reproduced correlation matrix; the diagonal, reproduced communalities; and the upper right triangle residuals between the observed correlations and the reproduced correlations.

There are 15 (53.0%) residuals (above diagonal) with absolute values > 0.05.

- - - - - - - - - - - F A C T O R A N A L Y S I S - - - - - - - - - - -

VARIMAX rotation 1 for extraction 1 in analysis 1 - Kaiser Normalization.

VARIMAX converged in 5 iterations.

Rotated Factor Matrix:

	Factor 1	Factor 2	Factor 3
P_DESCH	.80178	-.26286	.11322
R_ADV_CL	.61318	.22954	-.02630
R_INC_CL	.60449	.18187	-.06713
P_REL	.44487	.33189	-.04941
R_ADR	.02510	.74607	-.24039
R_MAN_CL	.32516	.73784	.31100
O_C_CLAM	.02833	-.12802	.78169
E_TENIN	.06523	-.05576	-.71160

Factor Transformation Matrix:

	Factor 1	Factor 2	Factor 3
Factor 1	.81766	.57464	.03488
Factor 2	.19401	-.33209	.92308
Factor 3	.54202	-.74800	-.38302

Factor Score Coefficient Matrix:

	Factor 1	Factor 2	Factor 3
E_TENIN	.09187	-.09966	-.56227
O_C_CLAM	.00311	-.06099	.60112
P_DESCH	.56730	-.36783	.02996
P_REL	.22147	.16707	-.04279
R_ADR	-.12597	.57056	-.14496
R_ADV_CL	.35040	.05251	-.03979
R_INC_CL	.35687	.01422	-.07401

------------ F A C T O R   A N A L Y S I S ------------

	Factor 1	Factor 2	Factor 3
R_MAN_CL	.04036	.53424	.26892

Covariance Matrix for Estimated Regression Factor Scores:

	Factor 1	Factor 2	Factor 3
Factor 1	1.00000		
Factor 2	.00000	1.00000	
Factor 3	.00000	.00000	1.00000